EFFECTIVENESS OF TENNIS BALL TECHNIQUE ON SLEEPING PATTERN AMONG OBSTRUCTIVE SLEEP APNEA PATIENTS

DISSERTATION SUBMITTED TO

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY, CHENNAI

In partial fulfillment of requirement for the degree of

MASTER OF SCIENCE IN NURSING

OCTOBER – 2018

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Certified that this is the bonafied work of

JASMINE SUBALA.D

Venkateswara Nursing College

Thalambur, Chennai – 600 130

COLLEGE SEAL :

SIGNATURE : ----------

Dr.(Mrs). CIBY JOSE

R.N., R.M., M.Sc (N), PGDGC, PhD (N).

Principal, Venkateswara Nursing College,

Thalambur, Chennai – 600 130.

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Approved by the Dissertation committee on July 2017

NURSING RESEARCH GUIDE

Dr. (Mrs). CIBY JOSE, R.N., R.M., M.Sc (N), PGDGC, PhD (N)., ----------

Principal, Venkateswara Nursing College,

Thalambur, Chennai – 600 130.

CLINICAL SPECIALITY GUIDE

Prof. (Mrs.) PRATHIBA SIVAKUMAR, M.Sc (N),(PhD)., ----------

Head of the Department,

Medical Surgical Nursing,

Venkateswara Nursing College,

Thalambur, Chennai – 600 130.

MEDICAL EXPERT

Dr.M.KUMARESAN, M.S. (ENT), D.L.O, ----------

Director,

Siva ENT Hospital,

Royapett, 159, Loyds Road,

Chennai – 600 014.

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LIST OF ABBREVIATIONS

AF	**-**	**Atrial Fibrillation**
AHI	**-**	**Apnea Hypoapnea Index**
CPAP	**-**	**Continuous Positive Airway Pressure**
ESS	**-**	**Epworth Sleepiness Scale**
IQR	**-**	**Inter Quartile Range**
NA	**-**	**No association**
OI	**-**	**Occupational Injury**
OSA	**-**	**Obstructive Sleep Apnea**
POSA	**-**	**Positional Obstructive Sleep Apnea**
PT	**-**	**Positional Therapy**
QSQ	**-**	**Quebee Sleep Questionnaire**
SPT	**-**	**Sleep Position Trainer**
TBT	**-**	**Tennis Ball Technique**
WHO	**-**	**World Health Organization**

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Effectiveness of tennis ball technique on sleeping pattern among obstructive sleep apnea patients.

Aim and Objective: To assess the effectiveness of tennis ball technique on level of sleeping pattern among obstructive sleep apnea patients. **Methodology:** Quasi experimental - pre test and post test deign, conducted in Siva ENT Hospital at Chennai. 60 patients were selected using purposive sampling technique. A planned power point presentation and demonstration of tennis ball techniques was the intervention of the study. The pre test and post test level of sleeping pattern was assessed using the standardized insomnia severity index scale. **Result:** The findings of the study revealed that the post-test scores of sleeping pattern among obstructive sleep apnea patients of experimental and control group had statistically significant difference, suggesting that tennis ball technique is very effective in improving the sleeping pattern. **Conclusion:** The results of the study concluded that tennis ball technique was effective in improving the sleeping pattern among obstructive sleep apnea patients, which is an important contribution to prevent obstructive sleep apnea complications and enhances the quality of sleep at night times.

Keywords: *level of sleeping pattern, obstructive sleep apnea, tennis ball technique*

INTRODUCTION

Obstructive sleep apnea is a potentially serious sleeping disorder. It causes breathing to pause repeatedly during sleep. This type of apnea occurs during throat muscles intermittently relax and blocks the air-way during sleep. A noticeable sign of obstructive sleeping apnea is snoring.

Tennis ball technique is a simple method of positional therapy that helps in avoiding sleeping on the back. It was first introduced in the early 1980s. A tennis ball is fastened to the back with a belt or strap. This makes sleeping on your back uncomfortable. Soft tissue in the throat is less likely to collapse and block the airway while sleeping on the sides. As a result positional therapy may help to reduce the breathing pauses that occur to patients with obstructive sleep apnea. It is a method used to prevent supine posture during sleep with a help of cloth strip inserting tennis ball on the back.

Objective

To assess the effectiveness of tennis ball technique among obstructive sleep apnea patients through demonstration and PowerPoint presentation using quantitative approach.

METHODOLOGY

Research design: Quasi experimental pretest and post test design with control group

Variables: Independent variable – Tennis Ball Technique

Dependent variable - Sleeping pattern

Setting: Siva ENT Hospitals, Royapettah, and Triplicane.

Population: The population of the study includes all OPD patients with obstructive sleep apnea at a selected hospital.

Sample size: The sample size of the study consists of 60 OSA patients (who fulfill the inclusive criteria).

Sampling Technique: Purposive sampling technique adopted to select samples.

Instruments used in the study:

The level of sleeping pattern was assessed using the insomnia severity index scale questionnaire. The tool consists of 7 questions. The overall scoring is 28 with a starting score of 0, and severe is 28.

Intervention:

The intervention is a planned demonstration of tennis ball technique to the patients through demonstration and power point presentation.

RESULTS

The study revealed that the pretest and post test results of the experimental group, the calculated paired 't' value of t = 16.794 was found to be statistically highly significant at

$p<0.001$ level. This clearly indicates that Tennis ball technique on sleeping pattern administered to patients with obstructive sleep apnea was found to be effective and there was significant improvement in their post test level of sleep pattern in the experimental group whereas in the control group the calculated paired 't' value of $t = -0.372$ was not found to be statistically significant.

This clearly concludes that planned teaching and demonstration on tennis ball technique on level of sleeping pattern among OSA patients was found to be effective in increasing the level of sleeping pattern with in experimental and control group.

DISCUSSION

The study findings revealed that there was a significant difference in the pre-test and post-test level of sleeping pattern among the patients with obstructive sleep apnea. There was a significant improvement in the level of sleeping pattern after providing tennis ball technique. Thus, Tennis ball technique was an effective intervention in improving the level of sleeping pattern among the patients with obstructive sleep apnea.

IMPLICATIONS

- A continuing nursing education program can be arranged on tennis ball technique and obstructive sleep apnea including sleeping pattern and de-saturation.
- In service education can be given to staff nurses and faculty members regarding tennis ball technique, and obstructive sleep apnea including sleeping pattern and de-saturation
- Tennis ball technique is one of the cost effective intervention for obstructive sleep apnea patients, so arrangements can be made for its preparation and use in ENT department.

INTRODUCTION

A long laugh and a long sleep are the best cure for anything

- ***Irish Proverb***

Obstructive sleep apnea is a potentially serious sleeping disorder. It causes the breathing to pause repeatedly during sleep. This type of apnea occurs during throat muscles intermittently relax and blocks the air-way during sleep. A noticeable sign of obstructive sleeping apnea is snoring.

A symptoms of excessive day time sleepiness, loud noise, awakening compared by gasping or chocking, awakening with a dry mouth, sore throat, morning headache, high blood pressure, night time sweating, mood changes, excessive day time drowsiness, which may cause to fall asleep during working, watching TV or driving vehicles.

Obstructive sleep apnea (OSA) is caused by repetitive obstruction of the upper airway during sleep, resulting in hypoapnea (reduced airflow during sleep) or apnea (complete airflow cessation during sleep). Persons with OSA may experience loud snoring, oxygen de-saturation, frequent arousals and disruption of sleep. Although evidence establishing a causal relationship is not currently available, OSA is associated with adverse clinical outcomes, including cardiovascular disease, hypertension, cognitive impairment and metabolic abnormalities, such as type 2 diabetes; and an increased risk for postoperative cardiac and respiratory complications.

Tennis Ball Technique is a simple method of positional therapy that helps in avoiding sleeping on the back. It was first introduced in the early 1980s. A tennis ball is fastened to the back with a belt or strap. This makes sleeping on your back uncomfortable. Soft tissue in the throat is less likely to collapse and block the airway while sleeping on the sides. As a result positional therapy may help reduce the breathing pauses that occur to patients with obstructive sleep apnea. It is a method used to prevent supine posture during sleep with a help of cloth strip inserting tennis ball on the back.

1.1 BACKGROUND OF THE STUDY

Obstructive sleep apnea (OSA) is the most common type of sleep apnea and is caused by complete or partial obstructions of the upper airway. These episodes of decreased breathing, called "apneas" (literally, "without breath"), typically last 20 to 40 seconds.

Obstructive sleep apnea syndrome is characterized by repetitive episodes of upper airway obstruction that occur during sleep, usually associated with a reduction in oxygen saturation. The snoring is commonly so loud that it disturbs the sleep of bed partners or others sleeping in close proximity. The patient occasionally will hear the snoring, but is usually not aware of the snoring intensity. The snoring may be exacerbated following the ingestion of alcohol before bedtime or following an increase in body weight.

There can be sudden awakenings following the obstructive events and complaints of nocturnal chest discomfort, choking, or suffocation that are associated with intense anxiety. Gastro-esophageal reflux can occur in association with the effort to reestablish breathing, particularly if the patient had eaten a large meal shortly before bedtime. Laryngospasm with stridor, and even cyanosis, may rarely occur as a result of the reflux. Secondary depression, anxiety, irritability, and even profound despair are commonly associated with the obstructive sleep apnea syndrome. Cardiac arrhythmias commonly occur during sleep in patients with the obstructive sleep apnea syndrome, and range from sinus arrhythmia to premature ventricular contractions, Atrio-ventricular block, and sinus arrest.

BUSINESS WIRE says that nearly 1 Billion People Worldwide Have Sleep Apnea, International Sleep Experts Estimate Researchers analyzed prevalence studies from 16 countries, together with data from the World Health Organization and United Nations World Population Prospects**.** SAN DIEGO--(BUSINESS WIRE)--A new data analysis presented by ResMed (NYSE: RMD, ASX: RMD at the American Thoracic Society in 2018, An International Conference indicates that the prevalence of sleep apnea impacts more than 936 million people worldwide – nearly 10 times greater than previous estimates. The study "*Global Prevalence of Obstructive Sleep Apnea (OSA)*" was conducted by an international panel of leading researchers seeking to provide a clear scope of the impact of the chronic sleep-disordered breathing condition. The previous estimation of OSA prevalence (100 million) came from a 2007 World Health Organization study that used methods and data available at the time. By analyzing technology improvements in detecting OSA and underreported statistics from other areas of the world, this latest study depicts an impacted population significantly larger than previously identified.

Times of India, Aug 02, 2013 published in Mumbai**:** Asian Heart Institute hosted a live robotic surgery course for treatment of obstructive sleep apnea. Dr. Agarwal said on an AIIMS study with his observations, he added " The number of the patients suffering from OSA is assumed to be strongly underestimated, studies suggest that the prevalence of OSA in the Indian population is 13 % in that only 4 were consulting doctors.

The traditional method of controlling positional obstructive sleep apnea (OSA), the so-called “tennis ball technique” in which the patient uses a physical device to avoid the supine posture during sleep, is inexpensive, easy to implement, and effective in the short term. But its compliance and effectiveness drop in the long term. As it has in other areas of sleep medicine, technology is offering solutions to improving compliance for treatments of positional OSA by making treatment easier, less invasive, and more data driven.

Several devices are currently on the market in the United States and abroad that researchers are finding to be even more effective, and more importantly, they improve compliance over longer stretches of time. About 70% of OSA patients have a supine component, so need some form of positional therapy, says **Daniel J. Levendwolski**, president and co-founder of Advanced Brain Monitoring, which produces the FDA-approved Night Shift device. **(Sleep review journal for sleep specialist May 26, 2015).**

1.2 NEED FOR THE STUDY

According to Sleep Apnea statistics, 2018 says that America is in the midst of a sleep epidemic, 50 -70 million US adults has sleep disorders and obstructive sleep apnea is one of the most prevalent sleep disorders. Approximately 3 – 7 % of men and 2-5% of women have sleep apnea. Worldwide, over 100 million people suffer from sleep apnea. 26% of adults aged 30-70 years have obstructive sleep apnea. Obstructive sleep apnea is associated with obesity in more than 60% of cases.

The influence of body position on obstructive sleep apnea (OSA) is well recognized, with an increase in sleep disordered breathing severity in the supine posture, most likely due to an increase in upper airway collapsibility and to a posterior displacement of the tongue. Upper airway collapsibility can also increase with decreased lung volume, which occurs in supine position due to a rostral displacement of the diaphragm, especially in the patients with large abdominal mass. Moreover, microgravity during space flight reduces sleep apnea and virtually suppresses snoring, which confirms the effect of gravity on sleep disordered breathing. The prevalence of positional sleep apnea varies from 50% to 60% of all OSA patients according to the various definitions of the condition. Some authors define positional sleep apnea as a 50% reduction in apnea–hypopnea index (AHI) during non-supine sleep, while others use more stringent criteria, requiring a 50% reduction and AHI. Six months and less than 6% at 2.5 years, with high variability between individuals and age groups. Moreover, the long-term efficacy of this device has not been proven at home. Given these poor results, this type of therapy is not considered a first line treatment by most clinicians. In our centre, we use a positional device derived from the tennis ball technique, with a firm

plastic piece applied on the back at the scapula level making a supine position uncomfortable. Shoulder straps prevent the plastic piece from moving to the side, which is the main problem with the traditional tennis ball technique. Given the lack of objective data on compliance and long term efficacy at home with this type of device, positional therapy is usually used only as a secondary therapy (i.e., in patients who did not tolerate CPAP or a dental appliance).

According to Healthcare India, the growing cases of sleep disorders in India is 93% of the population is sleep deprived, but only 2% Indian discuss their sleep issues with physicians. The prevalence of OSA is high in Western India. Statistics reveal that OSA in Indian males varied from 4.4% to 19.7% while among females it ranged from 2.5% to 7.4%. it has also been observed that approximately 60 - 70% of OSA patients are obese. Asian heart institute hosted a live robotic surgery course for treatment of obstructive sleep apnea, they said that 13% of Indians under threat of obstructive sleep apnea.

As frequently and recently stated, positional therapy (PT) constitutes a simple means of therapy in a common variant of sleep apnea syndrome (SAS) that nevertheless has failed to reach widespread use so far. On the one hand, this may be due to the fact that PT still does not seem to be accepted as efficient therapy, on the other hand compliance and comfort appear to be somewhat dubious. However, with supine position being predisposed for further breathing impairment; avoidance of such seems to be a straight-forward approach. As no standardized method exists, the possibilities are vast, ranging from tennis ball technique to backpacks and sleep position trainer with various outcomes, advantages and drawbacks. This is a highly variable definition of what exactly comprises positional SAS, add to the confusion in this field and hence to a lack of acceptance in the treating professionals. We therefore analyzed patients using a strict definition of positional SAS, but nevertheless making allowance to the fact that an appropriate PT must be an individual device. The aim of our study was to determine efficacy and efficiency of PT as well as to identify predictors of success.

In this modern running society people in the world are highly stressed to cope their life, in excess they also struggling with their sleeping pattern and tiredness. When people with Obstructive Sleep Apnea fall asleep, they can stop breathing for a few seconds to minutes or more. These conditions can be caused or made worse by obesity, stroke, diabetes mellitus, heart failure, heart attack. In order to prevent this, the researcher is interested and found Tennis Ball Technique would help on sleeping pattern among Obstructive Sleep Apnea patients.

1.3 STATEMENT OF THE PROBLEM

A study to assess the effectiveness of tennis ball technique on sleeping pattern among obstructive sleep apnea patients at selected hospitals, Chennai.

1.4 OBJECTIVES OF THE STUDY

- To evaluate the effectiveness of tennis ball technique on level of sleeping pattern among obstructive sleep apnea in the experimental group and control group.
- To find out the association between the post test levels of sleeping pattern among obstructive sleep apnea patients in the experimental group with their selected demographic variables.

1.5 OPERATIONAL DEFINITIONS

1.5.1 Effectiveness: Determining the improvement in sleeping pattern which will be measured through insomnia severity index scale questionnaire.

1.5.2 Tennis Ball Technique: This method used to prevent supine posture during sleep with a help of cloth strip inserting tennis ball and tied on patients body been demonstrated and re-inforced by power point presentation by the investigator for 45 minutes and advised to maintain this every night at home.

1.5.3 Sleeping pattern: It refers to a patient fall asleep quite easily, do not fully wake up during the night, do not wake up too early, and feel refreshed in the morning with no chance of dozing at day time.

1.5.4 Obstructive Sleep Apnea patients: It refers to the patients with sleep disorder who had the occurrence of throat muscles intermittently relax and block airway during sleep had moderate chance of dozing.

1.6 HYPOTHESES

H_1: There is a significant difference within the pre and post test level of sleeping pattern in experimental and control group.

H_2: There is a significant difference between pre and post test level of sleeping pattern among obstructive sleep apnea patients in experimental and control group.

H_3: There is a significant association between the post test level of sleeping pattern in experimental group with the selected demographic variables.

1.7 ASSUMPTION

The study assumes that

- Patient with obstructive sleep apnea will have some amount of day time sleepiness.
- Tennis Ball Technique will improve the level of sleeping pattern among Obstructive Sleep Apnea patients.

1.8 DELIMITATIONS:

- The study is delimited to patient with Obstructive Sleep Apnea .
- The study is delimited to a data collection period of 4 weeks.

1.9 CONCEPTUAL FRAME WORK:

A conceptual framework refers to frame work of prepositions for conducting research. Conceptual framework serves as a spring board for theory development. As this is made up of concepts which are mental images of a phenomenon.

The **KARL LUDWIG VON BERTALANFFY** was an Austrian born biologist known as one of the founders of general systems theory

The researcher adapted the conceptual framework based on karl Ludwig von bertalanffy general system theory (1972)

General system theory, therefore, is a general science of 'wholeness'.

There is a general tendency towards integration in the various sciences, natural and social.

Such integration seems to be centered in a general theory of systems

Such theory may be an important means of aiming at exact theory in the non visible fields of science.

Developing unifying principles running vertically through the universe of the individual sciences, this theory brings nearer to the goal of the unity of science.

This can lead to a much – needed integration in scientific education.

They are open because there is an ongoing exchange of matter, energy and information. In general system theory, the systems are composed of both structural and functional components that interact with in boundary, which filter the type and rate of exchange with the environment. A structure refers to the arrangements of the part at a given time whereas function is the process of continuous change in the system as matter, energy and information.

For survival a system much achieve a balance internally and externally. Equilibrium depends on the system's ability to regulate input and output to achieve a balanced relation of the interactive part and the process applied for proper balance. The system uses varies adaptation mechanisms to maintain equilibrium. Adaptation may occur through accepting or rejecting the matter, energy or information or by accommodating the input and modifying the system responses.

LUDWIG VON BERTALANFFY'S GENERAL SYSTEM THEORY FOCUSED ON THREE AREAS.

- Input
- Throughput
- Output

INPUT

According to general system input refers to the matter, energy or information from the environment into the system. Here the input includes subjects, age, sex, BMI, religion, educational status, mental status, area of residence, presence of snoring, occupation, type of family, sleeping hours more in both groups assessed by using insomnia severity index scale.

THROUGHPUT

In this model throughput refers to the procedure by which matter, energy and information that is modified are transformed within the system. In the present study it includes tennis ball technique was demonstrated and thought through PPT on sleeping pattern for 15- 20 min during night time in experimental group and hospital routine for control group.

OUTPUT

Output refers to the matter, energy and information that are released from the interaction of the system into the environment, in the present study the posttest level of sleeping pattern was assessed after 14 days using Insomnia severity index scale, It showed improvement in experimental group and there was no improvement in control group.

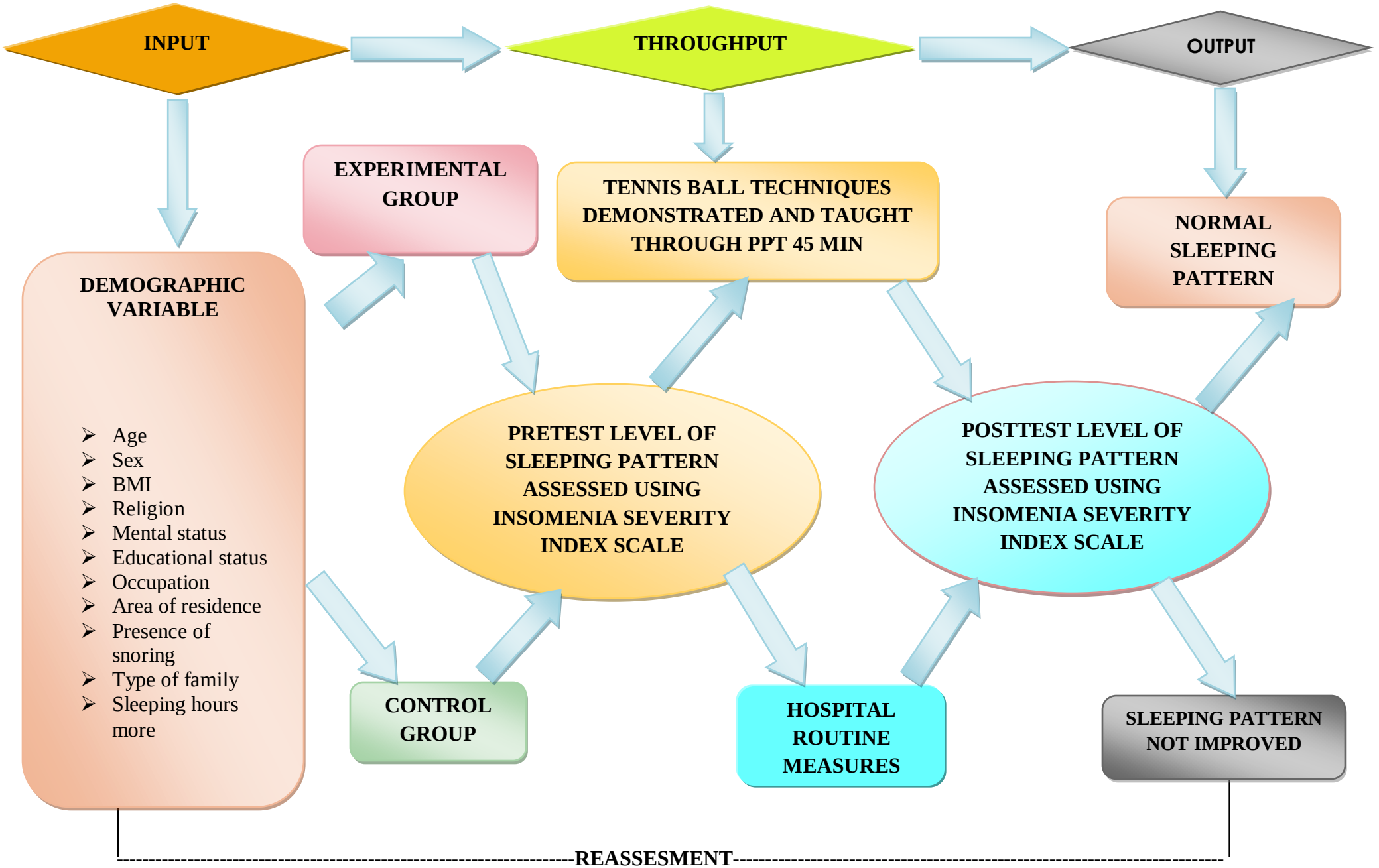


FIGURE: 1.9 CONCEPTUAL FRAMEWORK BASED ON LUDWIG VON BERTALARFF'S GENERAL SYSTEM THEORY - 1972

1.10 OUTLINE OF THE REPORT

Chapter 1: Dealt with background of the study, need for the study, statement of the problem, objectives, operational definition, research hypothesis, assumptions, conceptual framework and delimitation of the study.

Chapter 2: Deals with review of literature

Chapter 3: Presents the methodology of the study and plan for data analysis

Chapter 4: Focuses on data analysis and data interpretation

Chapter 5: Enumerate the discussion of the study.

Chapter 6: Gives the summary, conclusions, implications, limitations and recommendations for the study.

The study report ends with selected bibliography and appendices.

REVIEW OF LITERATURE

Review of literature is an essential component of the research study as it provides a broad understanding of the research problem. A review of literature involves the systemic identification, location, scrutiny, and summary of written materials that contain information about research problems (Polit and Hungler, 1998). A review of literature was collected to generate a picture of what is known about a particular situation.

The logical sequence of the chapter is organized in the following sections.

SECTION 2.1: Studies related to Obstructive Sleep Apnea.
SECTION 2.2: Studies related to effectiveness of Tennis ball Technique on Obstructive Sleep Apnea

SECTION 2.1: STUDIES RELATED TO OBSTRUCTIVE SLEEP APNEA.

Abumuamar A.M., et al. (2018) determined the prevalence and clinical predictors of OSA in patients with AF. Consecutive non selected patients with AF were selected from different arrhythmia clinics in Toronto, Ontario, Canada. Patients with previous diagnosis and/or treatment of OSA were excluded. Patients underwent 2 consecutive nights of ambulatory sleep testing with full electroencephalogram recording. OSA is common and often undetected in patients with AF, especially in non obese and/or female patients. Patients may have a normal overall AHI but an abnormal AHI during rapid eye movement sleep. The clinical relevance and therapeutic implications in this subgroup should be further investigated. The clinical features of OSA are not reliable predictors of OSA in patients with AF. A low threshold for detection of OSA, with sleep studies, in these patients may be merited.

Beyers J., et al. (2018) assessed the overall clinical effectiveness of sleep position trainer (SPT) in patients with positional obstructive sleep apnea (POSA) and to evaluate how many patients were willing to continue treatment after a 1-month trial period. Patients in whom POSA was diagnosed underwent a 1-month trial period with the SPT. Home sleep apnea tests were used to measure baseline data and data following the trial period with the SPT. A

significant reduction in overall REI to 5 (3, 10) events/h was observed with the SPT as compared to baseline (P< .001). Treatment with the SPT came with high adherence rates and was effective in reducing REI and supine sleep position.

Boon M., et al. (2018) involved in retrospective and prospective registry study that reveals the upper airway stimulation (UAS) is an alternative treatment option for patients unable to tolerate continuous positive airway pressure (CPAP) for the treatment of obstructive sleep apnea (OSA). Studies support the safety and efficacy of this therapy. The aim of this registry is to collect retrospective and prospective objective and subjective outcome measures across multiple institutions in the United States and Germany. To date, it represents the largest cohort of patients studied with this therapy, which had moderate to severe OSA, were intolerant to CPAP, and were undergoing UAS implantation. Baseline demographic and sleep study data were collected. Objective and subjective treatment outcomes, adverse events, and patient and physician satisfaction were reviewed. Across a multi-institutional registry, UAS therapy demonstrates significant improvement in subjective and objective OSA outcomes, good therapy adherence, and high patient satisfaction.

Csiszeriren I., et al. (2018) examined the association between the severity of obstructive sleep apnea and the pharyngeal parameters using the ultrasound of the sub-mental region. Data obtained from 40 patients, who had undergone investigations in the Galenus Medical Centre in order to diagnose sleep apnea, was analyzed. The following parameters were compared: the transverse diameter of the retro-lingual region, the transverse diameter of the retropalatal region and the tongue base thickness. The evaluation of the results revealed: severe obstructive sleep apnea in 16 patients, respectively moderate severity in 10 patients, mild apnea in 4 patients, and no obstructive sleep apnea in 10 patients. Statistically significant results ($p<0.05$) were found after comparing the parameters obtained in patients with severe apnea versus the parameters in patients without apnea, with mild or respectively moderate apnea.

Kim J., et al. (2017) conducted a study to evaluate the risk for OSA in obese Korean adults, and to examine the obesity indices most strongly associated with OSA. 30 obese patients were divided into low or high risk group of OSA using Berlin Questionnaire. Result shows that Eleven of the 30 patients (36.7%) were in the low OSA risk group and 19 (63.3%) were in the high OSA risk group. The correlation coefficients for BMI, neck circumference,

and neck-to-height ratio × 100(%) in the high-risk group versus the low-risk group were 1.03, 1.96, and 4.04, respectively (P = 0.03). They concluded that obesity index most strongly associated with OSA was neck circumference to height ratio**.**

Laub R.R., et al. (2017) tested the effect of the Sleep Position Trainer, a vibrational device, for positional sleep apnea in an open, randomized controlled trial with 101 patients, where 52 patients were allocated to Sleep Position Trainer and 49 patients to a non-treatment control group for 2 months (Part 1). All patients were then followed as a cohort for a period of 6 months with use of the Sleep Position Trainer (Part 2). The participants were assessed with polygraphy at entry, and after 2 and 6 months. It concluded that after 2 months use of the SPT they found a reduction in supine sleep and total AHI compared with controls. After 6 months use of the SPT, the effect was maintained and an improvement in daytime sleepiness was reported. In the subjects still using the SPT, the compliance was high. Overall, the SPT seems to be a successful therapy for well-selected patients with POSAS**.**

Marques M., et al. (2017) tested the hypothesis that the improvement in pharyngeal patency depends on the anatomical structure causing collapse, with patients with tongue-related obstruction and epiglottic collapse exhibiting preferential improvements. Twenty-four OSA patients underwent upper airway endoscopy during natural sleep to determine the pharyngeal structure associated with obstruction, with simultaneous recordings of airflow and pharyngeal pressure. Patients were grouped into three categories based on supine endoscopy: Tongue-related obstruction. Improvement in pharyngeal patency with sleeping position is structure specific, with profound improvements seen in patients with epiglottic collapse, modest effects in those without tongue involvement and unexpectedly no effect in those with tongue-related obstruction. Our data refute the notion that the tongue falls back into the airway during sleep via gravitational influences.

Allen A.J.H., et al. (2016) determined whether patients with obstructive sleep apnoea (OSA) are at increased risk of occupational injury (OI). Patients referred to the University of British Columbia Hospital Sleep Laboratory for suspected in the 5 years prior to polysomnography were calculated. In a sample of 1236, patients with OSA were twice as likely (OR=1.93, 95% CI 1.06 to 3.50, p=0.03) to suffer at least one OI compared with patients

without OSA. This association was attenuated (OR=1.76, CI 0.86 to 3.59, p=0.12) after controlling for confounders. In a secondary analysis, patients with OSA were almost three times more likely (OR=2.88, CI 1.02 to 8.08, p=0.05) to suffer from an injury more likely related to reduced vigilance (eg, a fall or commercial motor vehicle crash) when compared with patients without OSA, and this again was attenuated after controlling for confounders (OR=2.42, CI 0.085 to 6.93, p=0.10).

Airumaih H.S., et al. (2016) proposed to treat obstructive sleep apnea (OSA) and available literarures regarding the management of OSA. OSA can be managed through behavior management, continuous positive airway pressure (CPAP), oral appliances, and other therapies. Clinicians may select treatment modalities based on the severity of clinical presentation and the patient's symptoms. Studies showed an enhancement in the quality of life in many patients who have been treated with oral appliances, and patients in general prefer oral appliances over CPAP therapy or any other treatments for OSA because of its convenience.

Mc. Evoy R.D., et al. (2016) Obstructive sleep apnea is associated with an increased risk of cardiovascular events; whether treatment with continuous positive airway pressure (CPAP) prevents major cardiovascular events is uncertain. After a 1-week run-in period during which the participants used sham CPAP, we randomly assigned 2717 eligible adults between 45 and 75 years of age who had moderate-to-severe obstructive sleep apnea and coronary or cerebrovascular disease to receive CPAP treatment plus usual care (CPAP group) or usual care alone (usual-care group). In the CPAP group, the mean duration of adherence to CPAP therapy was 3.3 hours per night, and the mean apnea–hypoapnea index (the number of apnea or hypoapnea events per hour of recording) decreased from 29.0 events per hour at baseline to 3.7 events per hour during follow-up. After a mean follow-up of 3.7 years, a primary end-point event had occurred in 229 participants in the CPAP group (17.0%) and in 207 participants in the usual-care group (15.4%) (hazard ratio with CPAP, 1.10; 95% confidence interval, 0.91 to 1.32; P=0.34). No significant effect on any individual or other composite cardiovascular end point was observed. CPAP significantly reduced snoring and daytime sleepiness and improved health-related quality of life and mood.

Braverman I., et al. (2015) conducted a study to compare the effectiveness of coblation intracapsular tonsillectomy (ICT) and coblation complete tonsillectomy (CT) as treatments for OSA. It is a retrospective study of all the children aged 2 - 18 years with OSA who underwent coblation intracapsular tonsillectomy (ICT) or coblation complete tonsillectomy (CT) from January 2007 to August 2010 by the same surgeons at one institution. They concluded that Both ICT and CT were safe, with few complications; however recovery was faster in the ICT group, as demonstrated by less pain, and more rapid return to a solid food diet.

Jose R., et al. (2015) conducted a cross sectional study to compare the co-morbidities and sleep patterns most commonly associated with each gender in obstructive sleep apnea (OSA). A total of 284 subjects were included in the study, (147 females). Result concluded that there are gender differences both in the sleep patterns and in the co-morbidities of patients with OSA. Men had a larger neck circumference, higher apnea and sleep fragmentation scores, were more likely to consume alcohol, and were more likely to have a history of myocardial infarction than women.

Tabaj G.C., et al. (2015) conducted a retrospective study to determine the prevalence of OSA in a group of patients diagnosed with Idiopathic pulmonary fibrosis. Data were collected from the medical records of all patients diagnosed with IPF who had polysomnography . 36 patients were studied, 26 were male. The Epworth Sleepiness Scale (ESS) was used to assess the sleeping pattern, the results showed no correlation between ESS and the BMI with the presence of OSA in these patients, suggesting that these assessments may be less than optimal screening tools for OSA in IPF.

Amatoury J., **et al. (2015)** aimed to determine if arousal intensity is mediated by the strength of the preceding respiratory stimulus, and investigate other factors mediating arousal intensity and its role on post-arousal ventilatory and pharyngeal muscle responses. Data were acquired from 71 adults (17 controls, 54 obstructive sleep apnea patients) instrumented with polysomnography equipment plus genioglossus and tensor palatine electromyography (EMG), a nasal mask and pneumotachograph, and an epiglottis pressure sensor. Transient reductions in CPAP were delivered during sleep to induce respiratory-related arousals.

Benito A., **et al. (2015)** studied the association between insomnia and sleep apnea that received little attention from health professionals in the past few decades high prevalence of insomnia complaints in patients with objectively diagnosed obstructive sleep apnea (OSA) syndrome. This reviewed data published on different aspects of this association: the clinical profile of sleep-disordered breathing (SDB)-plus, the nature of the association, the role in the onset of insomnia played by OSA itself and other co morbidity factors such as depression or the restless leg syndrome. The apparent paradox implied by this clinical association reveals the need for interdisciplinary training for physicians who treat both types of disorders.

Mulgrew A.T., **et al. (2015)** conducted a workshop on obstructive sleep apnea (OSA). He administered the Epworth Sleepiness Scale (ESS), the Work Limitations Questionnaire (WLQ), and an occupational survey to 498 patients undergoing full-night polysomnography for the investigation of sleep-disordered breathing. Results demonstrated a clear relationship between excessive sleepiness and decreased work productivity in a population referred for suspected sleep-disordered breathing.

Brown E.C., **et al. (2014)** measured real-time movement of the tongue and lateral upper airway tissues in obstructive sleep apnea (OSA) subjects during wakefulness using tagged magnetic resonance imaging. Comparison of the dynamic imaging of three groups of increasing severity OSA and a control group approximately matched for age and body mass index. Four movement patterns were observed during inspiration: "en bloc" anterior movement of the whole posterior tongue; movement of only the or pharyngeal posterior tongue; bidirectional movement; or minimal movement. Some subjects showed different inspiratory movement patterns with different breaths. A low AHI (< 5) was associated with en bloc movement (P = 0.002). Inspiratory movement of the tongue varied between and within subjects, likely as a result of local and neural factors. However, in severe OSA inspiratory movement was minimal.

Qaseem A., et al. (2014) evaluated the guideline that includes all-cause mortality, cardiovascular mortality, nonfatal cardiovascular disease, stroke, hypertension, type 2 diabetes, postsurgical outcomes, and quality of life. Sensitivities, specificities, and likelihood ratios were

also assessed as outcomes of diagnostic tests. This guideline grades the evidence and recommendations by using ACP's clinical practice guidelines grading system. Disrupted sleep can result in hypersomnolence and impaired concentration during the day, increased probability of motor vehicle and other accidents, and decreased quality of life. Estimates range from 10% to 17% of the U.S. population, with the variation due in part to variable criteria used to define disease (for example, the number of apnic episodes per hour or whether individuals are required to have specific accompanying signs or symptoms). Prevalence of OSA increases with age, particularly in adults older than 60 years. The growing rate of obesity also contributes to increasing OSA prevalence.

Strollo p.j., et al. (2014) evaluated the clinical safety and effectiveness of upper-airway stimulation at 12 months for the treatment of moderate-to-severe obstructive sleep apnea. Using a multicenter, prospective, single-group, cohort design, they surgically implanted an upper-airway stimulation device in patients with obstructive sleep apnea who had difficulty either accepting or adhering to CPAP therapy. The primary outcome measures were the apnea-hypopnea index and the oxygen de-saturation index. Secondary outcome measures were the Epworth Sleepiness Scale, the Functional Outcomes of Sleep Questionnaire (FOSQ), and the percentage of sleep time with the oxygen saturation less than 90%. In this uncontrolled cohort study, upper-airway stimulation led to significant improvements in objective and subjective measurements of the severity of obstructive sleep apnea.

Krakow, **et al. (2013)** investigated the cause of nocturnal awakenings in patients with chronic insomnia. Anxiety, depression, and quality of life, a qualitative interview to assess subjective reasons for awakenings, and a diagnostic sleep study to objectively assess awakenings and their precipitants. Subjective and objective data showed clinically meaningful insomnia, primarily sleep maintenance insomnia. The most common self-reported reasons for awakenings were: uncertain cause (50%), nightmares (45%), nocturia (35%), bedroom distractions (20%), or pain (15%). No patient identified breathing symptoms as a cause. Objectively, 531 awakenings were observed in the total sample, and 478 (90%) were proceeded by sleep breathing events (apnea, hypopnea, or respiratory effort-related event). Fifty-three awakenings were caused by other factors (independent leg jerks, spontaneous, and sleep that was laboratory-induced .Thirty awakenings 5 min-a duration sufficient to predispose toward an insomnia episode-were each preceded by a breathing event.

Lobbeezoo F., et al. (2013) conducted a pilot study on Mandibular advancement devices in the treatment of obstructive sleep apnea and snoring in community dental care. The aim of the study was to evaluate the quality of sleep based on self report. A questionnaire was mailed to patients (n = 184) who had received treatment for OSA or snoring between 2007 and 2010 in the Helsinki Health Centre Oral Care Unit. The results show that treatment with a MAD improved perceived sleep quality and awoke alertness in mild and moderate OSA patients and in snorers. This study supports such treatment to be initiated and monitored in community dental care.

Wahida A.B., et al. (2013) conducted a study to highlight the prevalence of OSA among truck drivers and express bus drivers in Malaysia and efforts being undertaken to address issues related to OSA among commercial vehicle drivers. Two separate studies were conducted: a cross sectional study among truck drivers and secondly among express bus drivers. The screening process for identifying the high risk group for OSA was done using Berlin questionnaire. Meanwhile, among express bus drivers, OSA was confirmed with sleep study using polysomnography test. Result shows that Screening of risk group of OSA among truck drivers revealed that 14.6% (19) of drivers were categorized as having high risk of OSA while 85.4% (111) having low risk of OSA. While, in another study, polysomnography test among express bus drivers showed that 83 (28.7%) had mild OSA, 26 (9.0%) had AHI moderate OSA, and 19 drivers (6.6%) severe OSA.

SECTION 2.2 : STUDIES RELATED TO EFFECTIVENESS OF TENNIS BALL TECHNIQUE ON OBSTRUCTIVE SLEEP APNEA

Ravesloot M.J.L., et al. (2017) treated with a small device attached to either the neck or chest. These are new generation of devices for positional therapy (PT) to provide a subtle vibrating stimulus that prevents patients adopting the supine position. The objectives of this study were to determine whether PT is effective in improving sleep study variables and sleepiness, and to assess compliance. A systematic review and meta-analysis. There is strong evidence that the new generation of devices for PT are effective in reducing the apnea-

hypopnea index during short-term follow-up. These devices are simple-to-use for patients and clinicians and are reversible. Under study conditions with short-term follow-up, compliance is high; however, long-term compliance cannot be assessed because of lack of reliable data. Additional long-term, high-quality studies are needed to confirm the role of PT as a single or as a combination treatment modality for OSA patients and to assess long-term compliance.

Eijsvogel M.M., et al. (2015) investigated Sleep position trainer versus tennis ball technique in positional obstructive sleep apnea syndrome. 29 patients were treated with the Sleep Position Trainer (SPT), 26 patients with the Tennis Ball Technique (TBT). At baseline and 1 month poly somnography, Epworth Sleepiness Scale (ESS) and the Quebec Sleep Questionnaire (QSQ) were taken. Daily compliance was objectively measured in both group. The result concluded that in mild POSAS with normal EES the new SPT device and the standard TBT are equally effective in reducing respiratory indices. However, compared to the TBT, sleep quality, quality of life, and compliance improved significantly more in the SPT group.

Grietje E., et al. (2015) investigated the Usage of Positional Therapy in Adults with Obstructive Sleep Apnea. PT was used by 53 patients, of which 40 patients underwent a follow-up polygraphic evaluation under treatment after a median time interval of 12 weeks. Patients were routinely contacted regarding their clinical status and treatment compliance. PT was successful in 27 out of 40 patients (68%). Overall AHI reduced significantly from a median (interquartile range [IQR]) AHI of 14.5 (10.7–19.6) to 5.9 (3.1–8.5), $p < 0.001$. The commercial waistband and self-made constructions were equally effective (median (IQR) reduction in overall AHI (Δ9.6 (5.5–11.9) and Δ6.8 (3.2–11.3) respectively), $p = 0.22$). Short-term compliance was good as most patients used PT more than 7 hours/night (mean 7.2 ± SD 1.4) and more than 6 days/week (mean 6.5 ± SD 1.3). However, after mean 13 ± 5 months, 26 patients (65%) reported they no longer used PT, especially patients with moderate positional OSA (89%). This shows that on the short-term, PT using the tennis ball technique, is an easy method to treat most patients with positional OSA, showing significant reductions in AHI. Unfortunately, long-term compliance is low and close follow-up of patients on PT with regard to their compliance is necessary**.**

Matos P., et al. (2015) conducted a retrospective study on Positional sleep apnea: An issue of therapeutic adherence. A total of 93 positional OSA patients were retrospectively identified after a cardio-respiratory sleep study with 7 channels in our center, in which the supine AHI was at least twice as high as in a non-supine position. Booklets were provided to patients with information on hygiene, dietary and sleep rules, snoring and TBT. These patients were reassessed in a follow-up visit in average in 3-6 months, and a follow-up sleep study was then performed, under positional therapy with TBT. The results show that PT and other conservative measures were effective, with good clinical outcomes when enforced. There was a significant decrease in sleepiness accessed by ESS, and improvement in the overall sleep respiratory parameters.

RESEARCH METHODOLOGY

Methodology of research organizes all the components of study in a way that most likely will lead to valid answers for the problems that have been posted **(Burns and Groove, 2008)**. This chapter deals with the methodology adopted for the study. It includes the research approach, research design, variables, setting, population, sample, and criteria for selection of the sample, sample size, sampling technique, development and description of the tool, content validity, pilot study, and reliability of the tool, data collection procedure and plan for data analysis.

3.1 RESEARCH APPROACH

The research approach in this study is quantitative in nature focusing on the effectiveness of tennis ball techniques on sleeping pattern among obstructive sleep apnea patients.

3.2 RESEARCH DESIGN

The research design adopted for the present study is Quasi- experimental pre and post test design.

<table>
<tr><th>GROUP</th><th>PRETEST</th><th>INTERVENTION</th><th>POSTTEST</th></tr>
<tr><td>EXPERIMENTAL GROUP</td><td rowspan="2">Assessment of Pretest level of sleeping pattern among obstructive sleep apnea patient in experimental and control group using Insomnia Severity Index Scale.</td><td>Tennis ball technique taught through Power Point Presentation and demonstrated by the investigator for 45 min</td><td rowspan="2">Assessment of Post test level of sleeping pattern among obstructive sleep apnea patients in experimental and control group using Insomnia Severity Index Scale.</td></tr>
<tr><td>CONTROL GROUP</td><td>Hospital routine</td></tr>
</table>

3.3 VARIABLES OF THE STUDY

3.3.1 Independent Variables

The independent variable in this study is Tennis Ball Technique.

3.3.2 Dependent Variable

The dependent variable in this study is the level of sleeping pattern.

3.3.3 Extraneous Variables

The Extraneous variable of the study includes age, sex, BMI, religion, occupation, educational status, marital status, area of residence, presence of snoring, type of family, sleeping hours.

3.4 SETTING OF THE STUDY:

The study was conducted at Outpatient department in Siva ENT Clinic in Royapettah and Triplicane. It is 20 bedded hospitals. Nearly 50 patients with ENT problems attend the OP department every day.

3.5 POPULATION:

3.5.1 Target population

The target population of the study includes all patients with obstructive sleep apnea.

3.5.2 Accessible Population

The accessible population of the study includes all patients attending the outpatient department in SIVA ENT Hospitals, Royapettah and Triplicane, Chennai, with obstructive sleep apnea

3.6 SAMPLE

The study samples were 60 patients with obstructive sleep apnea who fulfill the inclusion criteria.

3.7 SAMPLE SIZE

The sample size is 60 Patients with obstructive sleep apnea. (30 - Experimental group, 30 - Control group)

3.8 SAMPLING CRITERIA

3.8.1 Inclusion criteria:

1. Patients diagnosed with obstructive sleep apnea with age group of 35 to 55 Yrs.
2. Patients with disturbed sleep due to snoring.
3. Patients with moderate chance of dozing in daytime.
4. Patients who are coming for review after 2 weeks.

3.8.2 EXCLUSIVE CRITERIA:

1. Patients diagnosed with other systemic illness.
2. Patients in the medical profession.
3. Patients who are using CPAP for OSA.
4. Patients with hearing and visual problems.

3.9 SAMPLING TECHNIQUE

Sampling technique adopted for this study was purposive sampling technique for selecting 60 patients with obstructive sleep apnea.

3.10 DEVELOPMENT AND DESCRIPTION OF THE TOOL

The investigator developed the tool on the basis of objectives of the study. The following steps were adopted prior to the development of the tool. Review of literature provided adequate content for the tool presentation, personal experience of the clinical field and opinion from experts of Medical Surgical Nursing department helped in devising the tool. The tool was developed in English and Tamil. This tool was a standardized tool.

The tool constructed for the study consists of two parts:

Part I: Data collection tool

Part II: Intervention tool

3.10.1 PART I: DATA COLLECTION TOOL

SECTION A: Assessment of demographic variable:

Personal data sheet on the demographic characteristics of the samples which includes Age, Sex, Educational status, Marital status, Religion, Occupation, Area of residence, Type of family, Sleeping hours, BMI, Presence of Snoring.

SECTION B: Insomnia Severity Index Scale

The Insomnia Severity Index has seven questions. The seven answers are added up to get a total score.

SCORING AND INTERPRETATION:

There are seven questions caring 4 marks each. The minimum score is 0 and the maximum score is 28.

CATEGORIES	**SCORE**
No clinically significant insomnia	0–7
Sub threshold insomnia	8–14
Clinical insomnia (moderate severity)	15–21
Clinical insomnia (severe)	22–28

3.10.2 PART II: Intervention Tool

The intervention tool was prepared by the investigator, that involves planned health teaching with power point presentation accompanied with demonstration of Tennis ball Technique.

S.No.	**Components**	**Time (Minutes)**
1.	Obstructive Sleep Apnea	5
2.	Tennis Ball Technique	5
3.	Relation between OSA and TBT	5
4.	Reason to use TBT	5
5.	Advantages of TBT	5
6.	Tennis ball technique- demonstration	20
	Total	**45**

The health teaching and demonstration was given to the samples (5 – 10 patients in a group) and advised to follow the same technique while sleeping in the night time at home.

3.11 CONTENT VALIDITY

The content validity of the data collection tool and the intervention tool was ascertained with the expert's opinion in the following field of expertise,

- Medical Expert - 2
- Medical surgical nursing experts - 4
- Statistician - 1

Modifications suggested by the experts were incorporated and tool was modified accordingly. These changes were incorporated in the tool. All the experts gave their consents and then the tool was finalized.

3.12 ETHICAL CONSIDERATION

The research study was approved by the institutional Ethical Committee of Venkateswara Nursing College which was held on 3/7/2017 and the ethical principles followed were:

1. BENEFICIENCE

The investigator followed the fundamental ethical principle of beneficence by adhering to

a) The right to freedom from harm and discomfort

The study was beneficial for the participants, as the use of structured teaching and demonstration enhanced their level of sleeping pattern and implement in their day to day life. No harm or discomfort was caused to any of the participants.

b) The right to protection from exploitation

The investigator explained the procedure and nature of the study to the participants and to the medical director and ensured that none of the participants would be exploited.

2. RESPECT FOR HUMAN DIGNITY

The investigator followed the second ethical principle of respect for human dignity. It includes the right to self-determine and right to self disclosure.

a) The right to self – determination

The investigator gave full freedom to the participants to decide voluntarily whether to participate in the study or to withdraw from the study and the right to ask questions.

b) The right to full disclosure

The investigator has fully described the nature of the study, the person's right to refuse participation and the investigator's responsibilities based on which the written permission was obtained from the medical director of SIVA ENT Hospital, Royapettah, Chennai. The written consent was obtained from the patients to assess the level of sleeping pattern among OSA patients.

3. JUSTICE

The investigator adhered to the third ethical principal of justice, it includes participant's right to fair treatment and right to privacy.

a) Right to fair treatment

The investigator selected the study participant's based on the research requirements. The investigator followed the hospital rules and regulations, during the period of data collection and during the intervention period. All the samples were treated fairly and no discrimination of any form was imposed on them.

b) Right to privacy

The investigator maintained the participant's privacy throughout the study.

4. CONFIDENTIALITY

The investigator maintained confidentiality of the data disclosed by the study participants.

3.13 REALIBILITY OF THE TOOL

The reliability of the tool was assessed using test retest method. The reliability of the tool is r = 0.91 and the tool is highly considered as highly reliable for proceeding with the main study.

3.14 PILOT STUDY

A pilot study was conducted to assess the feasibility and practicability of the study and it also helped to determine the plan of data analysis. Prior permission to conduct the study was obtained from the medical director of Siva ENT Hospital, Chennai. The pilot was conducted from 20.1.18 to 27.1.18. 12 patients (control group - 6 and experimental group - 6) with obstructive sleep apnea who fulfill the inclusive criteria were selected by purposive sampling technique. The purpose of the study was explained to patients and a written consent was obtained from patients. Confidentiality was assured to all the subjects.

The demographic variable was obtained with the help of structured questionnaire. Pretest assessment on the level of sleeping pattern was done with insomnia severity index scale and then each participant in experimental group was demonstrated and reinforced with power point presentation about tennis ball technique for 45 min, post test assessment on level of sleeping pattern among obstructive sleep apnea patients in experimental and control group were assessed after 7 days. Data collected was analyzed using descriptive and inferential statistics.

The result showed that there was significant difference among the post test level of sleeping pattern in experimental group. The tool was found feasible to proceed for the main study.

3.15 DATA COLLECTION PROCEDURE

The main study was conducted after obtaining formal permission from the principal, Venkateswara Nursing College, ethical clearance from the ethical committee and permission from the Medical Director of SIVA ENT Hospitals. The data was collected for a period of 4 weeks from 29.01.2018 to 25.02.2018 in SIVA ENT Hospitals, Royapettah and Triplicane, Chennai.

A brief self introduction along with an explanation of the purpose of the study was given to the medical director of the hospital. With the permission of the medical director the data collection procedure commenced.

Oral and written informed consent was taken from the obstructive sleep apnea patients. A total of 60 samples (30 samples in experimental group and 30 samples in control group) were selected by purposive sampling technique who fulfilled the inclusive criteria.

At first, Demographic data was obtained from the participants through structured questionnaire. Then, the pretest assessment on the level of sleeping pattern was done with Insomnia severity index scale for both experimental and control group.

Tennis ball technique was taught by investigator through PowerPoint presentation in a group and demonstrated the same to the experimental group for 45 minutes and advised the participants to maintain this technique while sleeping in night time in home for 14 days. The control group was in involved in routine hospital measures.

The Post-test assessment was done on the level of sleeping pattern in experimental and control group using insomnia severity index scale on 15th day during their review. All ethical principles were adhered throughout the course of the study.

3.16 PLAN FOR DATA ANALYSIS PROCEDURE

Data collected were analyzed by descriptive and inferential statistics.

3.16.1 Descriptive statistical analysis:

- Frequency, percentage distribution, was used to describe demographic variable.
- Mean and standard deviation was used to assess the level of sleeping pattern among obstructed sleep apnea patients.

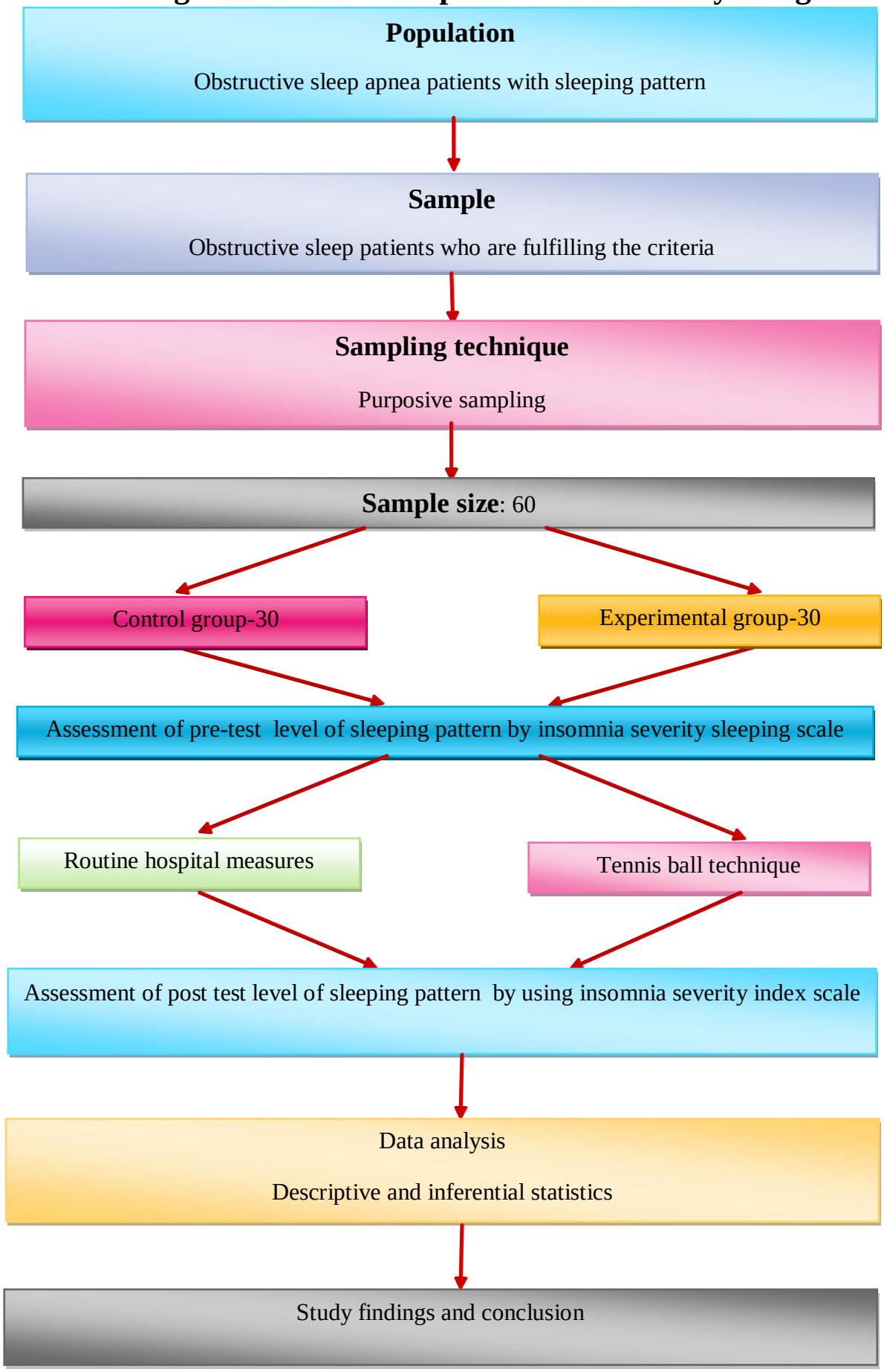
3.16.2 Inferential statistical analysis:

- Paired t test was used compare pre test and post test mean score level of sleeping pattern among obstructive sleep apnea patients in experimental and control group.
- Unpaired t test was used to compare pre test and post test mean score level of sleeping pattern among obstructive sleep apnea patients in experimental and control group.
- Chi- square test was used to find the association between the pre test and post test mean score level of sleeping pattern among obstructive sleep apnea patients.

TABULATION OF PLAN FOR DATA COLLECTION

S.NO	Data Analysis	Methods	Remarks
1.	Descriptive statistics	Frequency and percentage	To assess the demographic variables of the sample
		Mean, standard deviation	To assess the level of pre and post-test sleeping pattern on TBT among OSA patients.
2.	Inferential statistics	Paired 't' test	Paired 't' test to compare the pre-test and post-test level of sleeping pattern on TBT among OSA patients in experimental and control group.
		Unpaired 't' test	Unpaired 't' test to compare the pre-test and post-test level of sleeping pattern on TBT among OSA patients between experimental and control group.
		Chi-square test	To find the association between post-test sleeping pattern with their demographic variables

Fig 3.1: Schematic Representation of Study Design



DATA ANALYSIS AND INTERPRETATION

This chapter deals with the analysis and interpretation of data collected from 60 patients with obstructive sleep apnea, to assess the effectiveness of Tennis ball technique on sleeping pattern among obstructive sleep apnea patients at selected hospital, Chennai. The data collected for the study was grouped and analyzed as per the objectives set for the study.

ORGANIZATION OF DATA

The findings of the study were grouped and analyzed under the following section.

Section A : Description of the demographic variables.

Section B : Assessment of pretest and post test level of sleeping pattern among obstructive sleep apnea patients in the experimental and control group.

Section C : Effectiveness of Tennis ball technique on sleeping pattern among obstructive sleep apnea patients in the experimental and control group.

Section D : Effectiveness of Tennis ball technique on sleeping pattern among obstructive sleep apnea patients between the experimental and control group.

Section E : Association of post test level of sleeping pattern among patients with obstructive sleep apnea with their selected demographic variables in the experimental group.

SECTION A: DESCRIPTION OF THE DEMOGRAPHIC VARIABLES.

Table 4.1: Frequency and percentage distribution of demographic variables of the patients with obstructive sleep apnea in the experimental and control group.

N = 60

Demographic Variables	Experimental Group(30)		Control Group(30)	
	No.	%	No.	%
Age				
35 - 40 years	08	26.67	10	33.33
41 - 45 years	14	46.67	10	33.33
46 - 55 years	02	6.67	05	16.67
56 - 65 years	06	20.00	05	16.67
Sex				
Male	28	93.33	30	100.00
Female	02	6.67	00	0.00
BMI				
<18.5	08	26.67	09	30.00
18.5 - 25.0	12	40.00	14	46.67
26 – 30	10	33.33	06	20.00
>30	00	0.00	01	3.33
Religion				
Hindu	26	86.67	29	96.67
Muslim	03	10.00	01	3.33
Christian	01	3.33	00	0.00
Others	00	0.00	00	0.00
Marital status				
Married	22	73.33	22	73.33
Single	08	26.67	08	26.67
Widow/Widower	00	0.00	00	0.00
Divorced	00	0.00	00	0.00
Educational status				
Graduate / Post graduate	13	43.33	15	50.00
Intermediate / Post high school diploma / High school	10	33.33	08	26.67
Middle school	00	0.00	03	10.00
Primary	00	0.00	00	0.00
Illiterate	07	23.33	04	13.33
Occupation				
Skilled	14	46.67	14	46.67
Semi-skilled	06	20.00	07	23.33
Unskilled	08	26.67	04	13.33
Unemployed	02	6.67	05	16.67
Area of residence				
Urban	19	63.33	18	60.00

Demographic Variables	Experimental Group(30)		Control Group(30)	
	No.	%	No.	%
Rural	07	23.33	08	26.67
Semi – urban	04	13.33	04	13.33
Presence of snoring				
Yes	30	100.00	30	100.00
No	00	0.00	00	0.00
Type of family				
Nuclear family	21	70.00	16	53.33
Joint family	09	30.00	12	40.00
Extended family	00	0.00	00	0.00
Others	00	0.00	02	6.67
Sleeping hours more				
Day time	17	56.67	20	66.67
Night time	13	43.33	10	33.33

The table 4.1 shows that in the experimental group, majority 14(46.67%) were in the age group of 41 – 45 years, 28(93.33%) were male, 12(40%) were in the BMI range of 18.5 – 25.0, 26(86.67%) were Hindus, 22(73.33%) were married, 13(43.33%) were graduate or post graduates, 14(46.67%) were skilled workers, 19(63.33%) were residing in urban area, almost all 30(100%) had the presence of snoring, 21(70%) belonged to nuclear family and 17(56.67%) were sleeping more during the day time.

Whereas in the control group, 10(33.33%) were in age group of 35 – 40 and 41 – 45 years respectively, almost all 30(100%) were male, 14(46.67%) were in the BMI range of 18.5 – 25.0, 29(96.67%) were Hindus, 22(73.33%) were married, 15(50%) were gradudate / post graduates, 14(46.67%) were skilled workers, 18(60%) were living in urban area, almost all 30(100%) had the presence of snoring, 16(53.335) belonged to nuclear family and 20(66.67%) were sleeping more during the day time.

SECTION B: ASSESSMENT OF PRETEST AND POST TEST LEVEL OF SLEEPING PATTERN AMONG OBSTRUCTIVE SLEEP APNEA PATIENTS IN THE EXPERIMENTAL AND CONTROL GROUP.

Table 4.2: Frequency and percentage distribution of pretest and post test level of sleeping pattern among obstructive sleep apnea patients in the experimental group.

N = 30 + 30

Experimental Group	No Insomnia (0 – 7)		Subthreshold Insomnia (8 – 14)		Clinical Insomnia (15 – 21)		Severe Insomnia (22 – 28)	
	No.	%	No.	%	No.	%	No.	%
Pretest	02	6.67	09	30.0	05	16.67	14	46.67
Post test	12	40.0	18	60.0	00	00	00	00

The table 4.2 shows that in the pretest, 14(46.67%) had severe insomnia, 5(16.67%) had clinical insomnia, 9(30%) had subthreshold insomnia, and 2(6.67%) had no insomnia whereas in the post test after the tennis ball technique on sleep pattern, 18(60%) had subthreshold insomnia and 12(40%) had no insomnia.

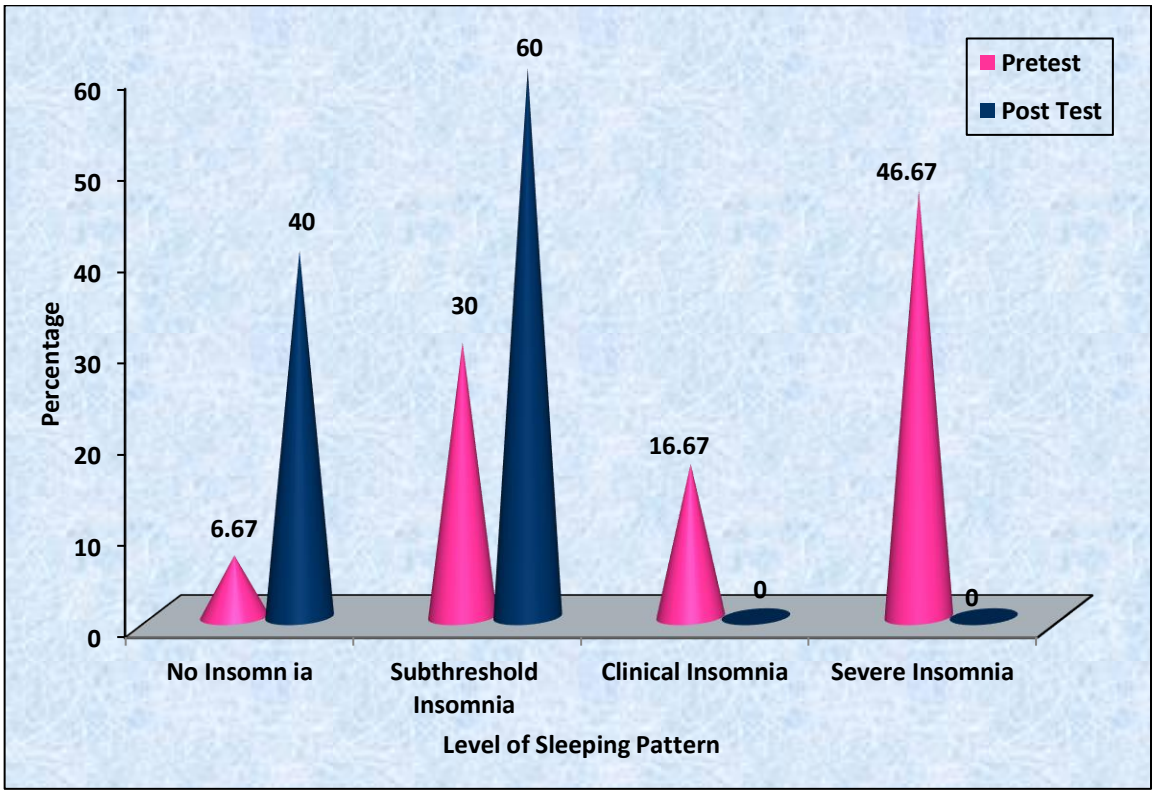


Figure: 4.1 Percentage distribution of pretest and post test level of sleeping pattern among obstructive sleep apnea patients in the experimental group.

Table 4.3: Frequency and percentage distribution of pretest and post test level of sleeping pattern among obstructive sleep apnea patients in the control group.

N = 30 + 30

Control Group	No Insomnia (0 – 7)		Subthreshold Insomnia (8 – 14)		Clinical Insomnia (15 – 21)		Severe Insomnia (22 – 28)	
	No.	%	No.	%	No.	%	No.	%
Pretest	00	00	02	6.67	24	80.0	04	13.33
Post Test	00	00	02	6.67	25	83.33	03	10.0

The table 4.3 shows that in the pretest, 2(6.67%) had subthreshold insomnia, 24(80%) had clinical insomnia and 4(13.33%) had severe insomnia whereas in the post test 2(6.67%) had subthreshold insomnia, 25(83.33%) had clinical insomnia and 3(10%) had severe insomnia.

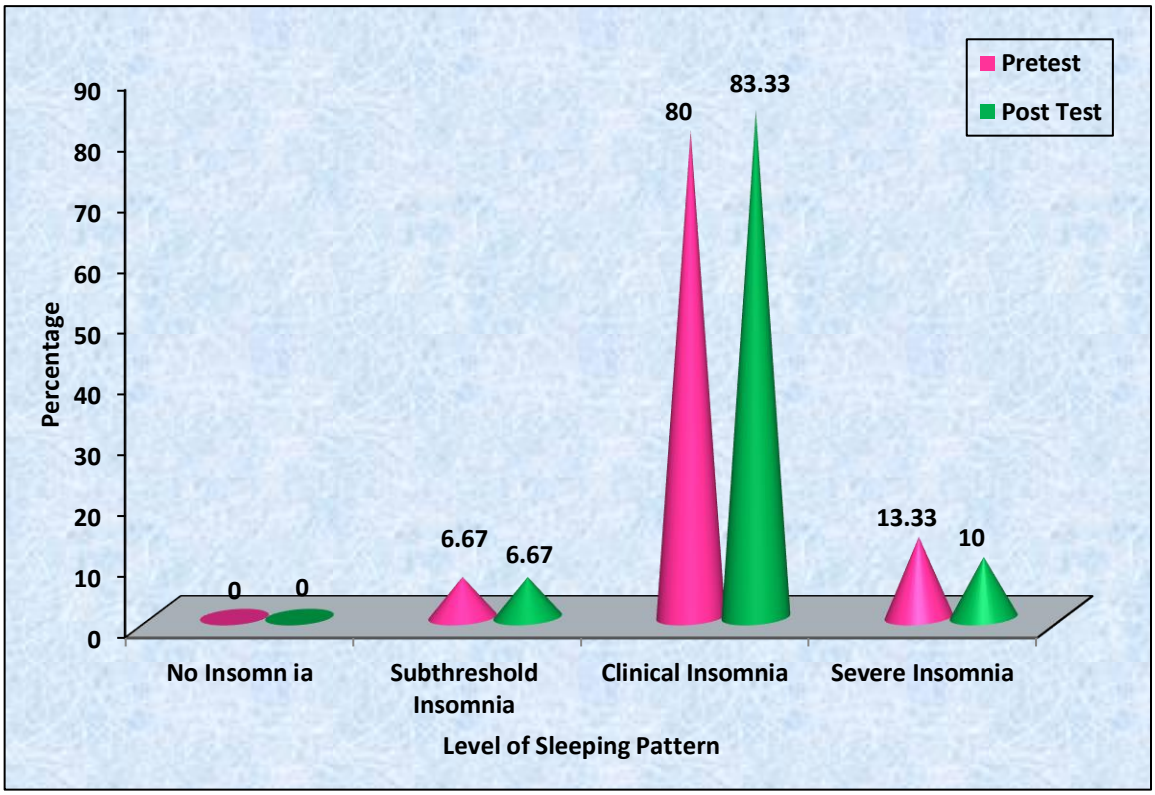


Figure 4.2 Percentage distribution of pretest and post test level of sleeping pattern in the control group

SECTION C: EFFECTIVENESS OF TENNIS BALL TECHNIQUE ON SLEEPING PATTERN AMONG OBSTRUCTIVE SLEEP APNEA PATIENTS IN THE EXPERIMENTAL AND CONTROL GROUP.

Table 4.4: Comparison of pretest and post test level of sleeping pattern among obstructive sleep apnea patients within the experimental and control group.

N = 60(30+30)

Group	Pretest		Post Test		Mean Improvement Score & %	Paired 't' Test Value
	Mean	S.D	Mean	S.D		
Experimental	17.20	7.05	6.23	4.09	10.97 (39.18%)	**t = 16.794 p = 0.000, S*****
Control	19.30	2.83	19.33	2.67	-0.03 (-0.11%)	t = -0.372 p = 0.712, N.S

***p<0.001, S – Significant, N.S – Not Significant

The table 4.4 portrays that the experimental group pretest mean score of sleep pattern was 17.20±7.05 and the post test mean score was 6.23±4.09. The mean improvement score was 10.97 i.e., 39.18%. The calculated paired 't' value of t = 16.794 was found to be statistically highly significant at p<0.001 level. The control group pretest mean score of sleep pattern was 19.30 ±2.83 and the post test mean score was 19.33±2.67. The mean improvement score was -0.03 i.e., -0.11%. This clearly indicates that Tennis ball technique on sleeping pattern administered to patients with obstrucftive sleep apnea was found to be effective and there was significant improvement in their post test level of sleep pattern in the experimental group whereas in the control group the calculated paired 't' value of t = -0.372 was not found to be statistically significant.

These findings clearly indicates that the tennis ball technique on sleeping pattern was found to be effective in improving the sleep pattern among obstructive sleep apnea patients in the experimental group than the patients in the control group who had undergone normal hospital routine measures.

SECTION D : EFFECTIVENESS OF TENNIS BALL TECHNIQUE ON SLEEPING PATTERN AMONG OBSTRUCTIVE SLEEP APNEA PATIENTS BETWEEN THE EXPERIMENTAL AND CONTROL GROUP.

Table 4.5: Comparison between pretest and post test level of sleeping pattern among obstructive sleep apnea patients in experimental group.

GROUPS	Pretest		Post Test	
	Mean	S.D	Mean	S.D
Experimental Group	17.20	7.05	6.23	4.09
Control Group	19.30	2.83	19.33	2.67
Mean Difference Score & %	2.10 (7.5%)		13.10 (46.78%)	
Unpaired 't' Test value	t = 1.514 p = 0.138 N.S		**t = 14.667** **p = 0.000** **S*****	

The table 4.5 portrays that the experimental group pretest mean score and S.D of sleep pattern was 17.20±7.05 and the post test mean score and S.D was 6.23±4.09. Whereas in the control group pretest mean score and S.D of sleep pattern was 19.30 ± 2.83 and the post test mean score and S.D was 19.33 ± 2.67. The pretest mean difference score for experimental and control group was 2.10 i.e, 7.5% and in post test was 13.10 i.e, 46.78%. This clearly indicates that Tennis ball technique on sleeping pattern administered to patients with obstructive sleep apnea was found to be effective in increasing the level of sleeping pattern.

The calculated unpaired 't' value of t = 1.514 in the pretest between the experimental and control group was not found to be statistically significant and this clearly indicates that there was no difference in the pretest level of sleep pattern among patients with sleep apnea in the experimental and control group. Whereas the calculated unpaired 't' value of t = 14.667 in the post test between the experimental and control group was found to be statistically significant at $p<0.001$ level and this clearly indicates that there was significant difference in the post test level of sleep pattern among patients with sleep apnea in the experimental and control group.

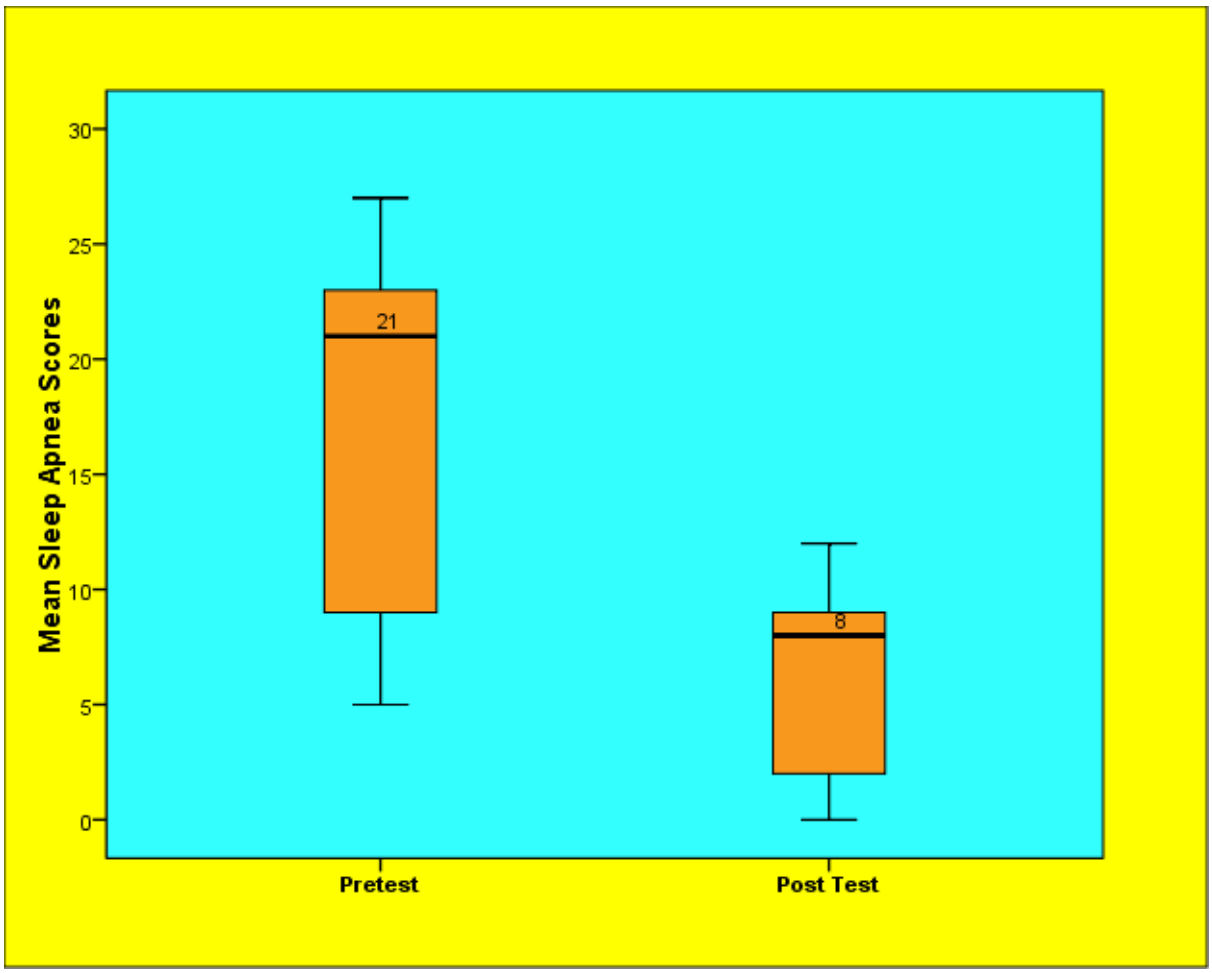


Figure 4.3 Comparison of pretest and post test level of sleep pattern among the obstructive sleep apnea patients in the experimental group

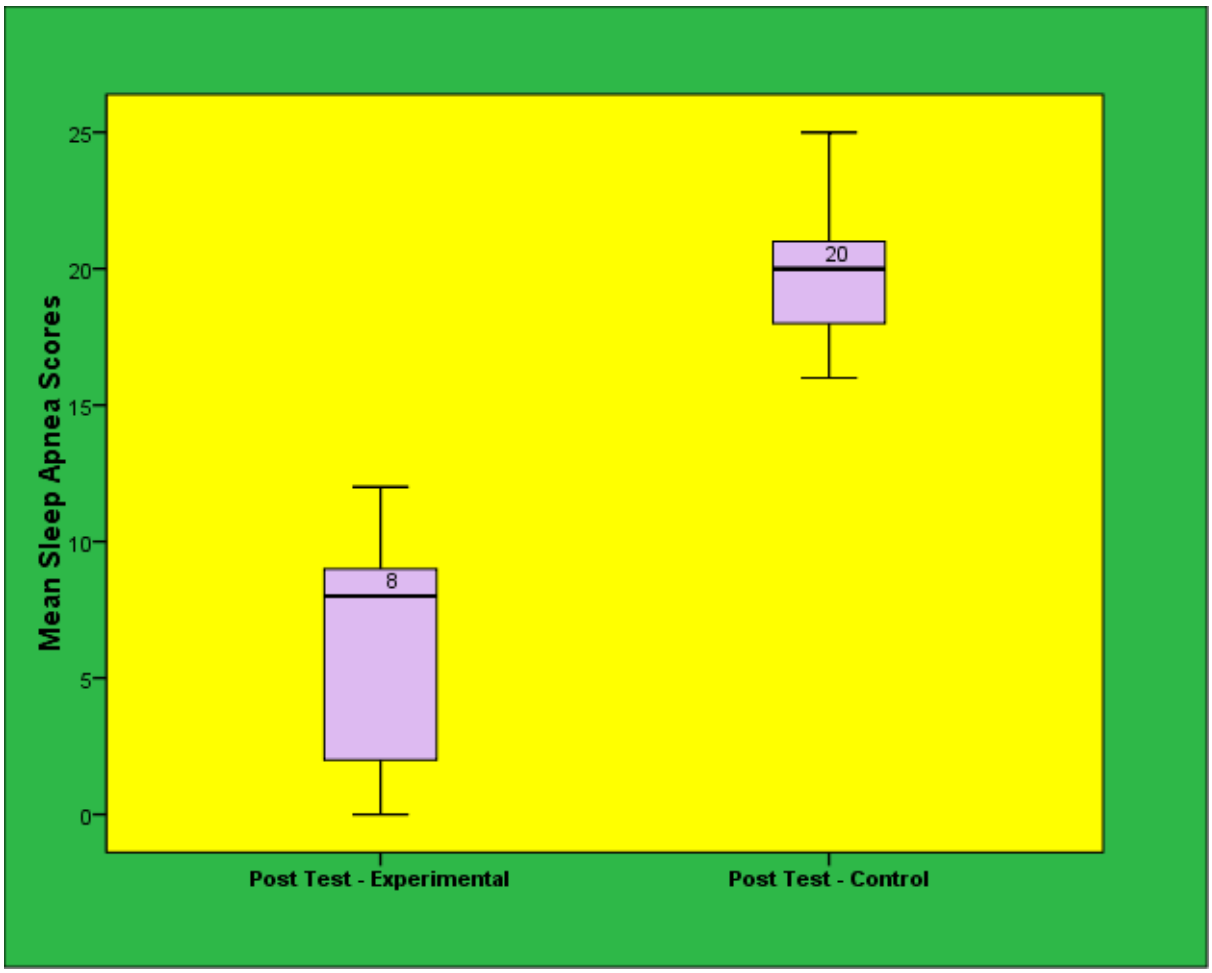


Figure 4.4 Comparison of post test level of sleep pattern among the obstructive sleep apnea patients between the experimental and control group

SECTION E: ASSOCIATION OF POST TEST LEVEL OF SLEEP PATTERN AMONG PATIENTS WITH OBSTRUCTIVE SLEEP APNEA WITH THEIR SELECTED DEMOGRAPHIC VARIABLES IN EXPERIMENTAL GROUP.

Table 4.6: Association of post test level of sleep pattern among obstructive sleep apnea patients with their selected demographic variables in the experimental group.

N = 30 Experimental Group

Demographic Variables	No Insomnia (0 – 7)		Subthreshold Insomnia (8 – 14)		Chi-Square Value
	No.	%	No.	%	
Age					**χ^2=8.274 d.f=3 p = 0.041 S***
35 - 40 years	06	20.0	02	6.7	
41 - 45 years	05	16.7	09	30.0	
46 - 55 years	01	3.3	01	3.3	
56 - 65 years	00	0	06	20.0	
Sex					χ^2=0.089 d.f=1 p = 0.765 N.S
Male	11	36.7	17	56.7	
Female	01	3.3	01	3.3	
BMI					**χ^2=6.493 d.f=2 p = 0.039 S***
<18.5	03	10.0	05	16.7	
18.5 - 25.0	02	6.7	10	33.3	
26 – 30	07	23.3	03	10.0	
>30	-	-	-	-	
Religion					χ^2=0.780 d.f=2 p = 0.677 N.S
Hindu	11	36.7	15	50.0	
Muslim	01	3.3	02	6.7	
Christian	00	0	01	3.3	
Others	-	-	-	-	
Marital status					χ^2=0.455 d.f=1 p = 0.500 N.S
Married	08	26.7	14	46.7	
Single	04	13.3	04	13.3	
Widow/Widower	-	-	-	-	
Divorced	-	-	-	-	
Educational status					χ^2=0.810 d.f=2 p = 0.667 N.S
Graduate / Post graduate	05	16.7	08	26.7	
Inter /Post high school dip./High school	05	16.7	05	16.7	
Middle school	-	-	-	-	
Primary	-	-	-	-	
Illiterate	02	6.7	05	16.7	
Occupation					χ^2=1.429 d.f=3 p = 0.699 N.S
Skilled	04	13.3	10	33.3	
Semi-skilled	03	10.0	03	10.0	
Unskilled	04	13.3	04	13.3	
Unemployed	01	3.3	01	3.3	

Demographic Variables	No Insomnia (0 – 7)		Subthreshold Insomnia (8 – 14)		Chi-Square Value
	No.	%	No.	%	
Area of residence					χ^2=3.558 d.f=2 p = 0.169 N.S
Urban	08	26.7	11	36.7	
Rural	04	13.3	03	10.0	
Semi – urban	00	0	04	13.3	
Presence of snoring					-
Yes	12	40.0	18	60.0	
No	-	-	-	-	
Type of family					χ^2=1.693 d.f=1 p = 0.193 N.S
Nuclear family	10	33.3	11	36.7	
Joint family	02	6.7	07	23.3	
Extended family	-	-	-	-	
Others	-	-	-	-	
Sleeping hours more					χ^2=0.814 d.f=1 p = 0.367 N.S
Day time	08	26.7	09	30.0	
Night time	04	13.3	09	30.0	

N.S – Not Significant

The table 4.6 despites that the demographic variables age and BMI had shown statistically significant association with post test level of sleep pattern among obstructive sleep apnea patients at $p<0.05$ level and the other demographic variables had not shown statistically significant association with post test level of sleep pattern among obstructive sleep apnea patients in the experimental group.

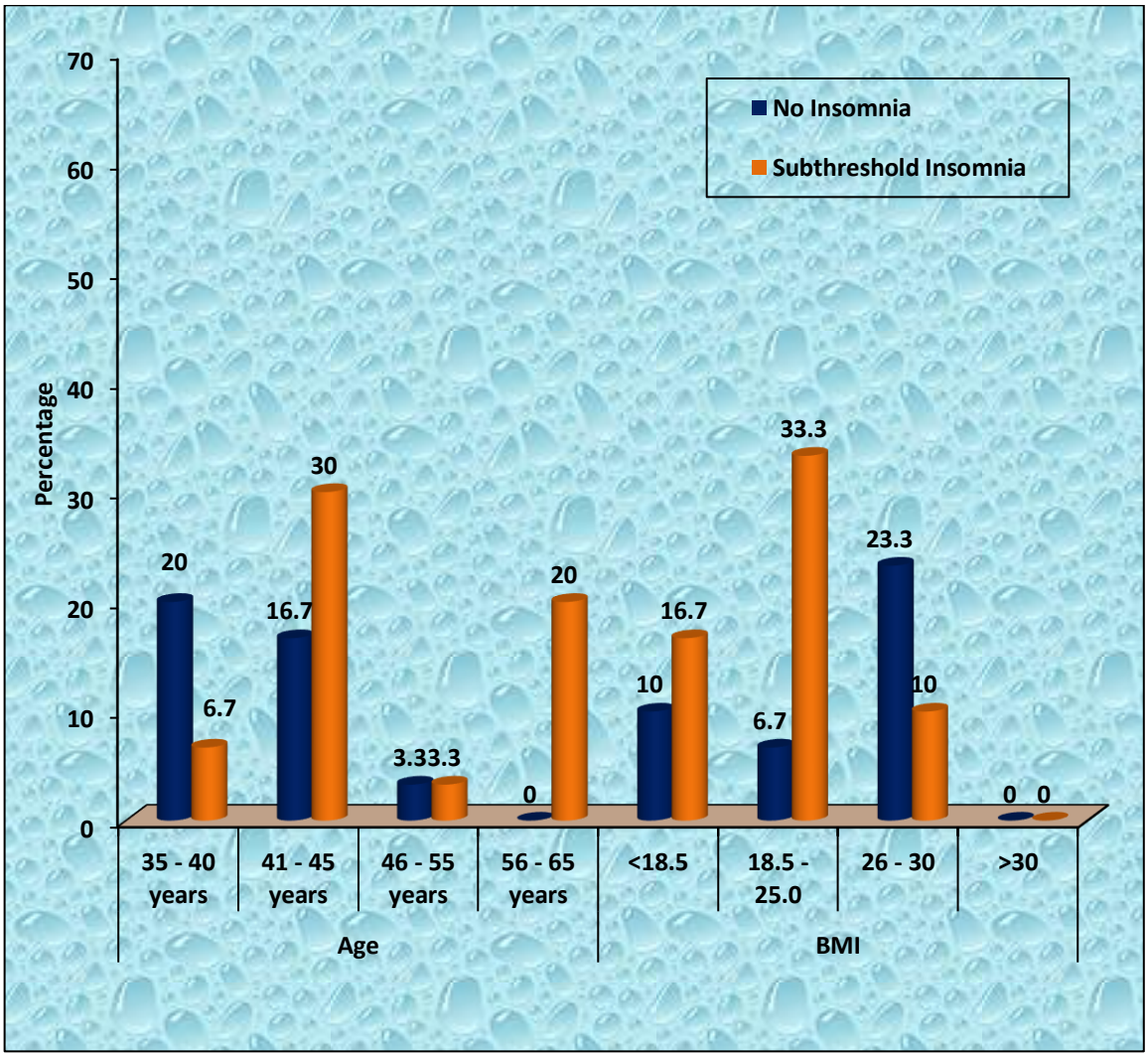


Figure 4.5 Association of post test level of sleep pattern among obstructive sleep apnea patients with their selected demographic variables in the experimental group such as age and BMI

DISCUSSION

This chapter deals with the discussion of the results of the data analyzed based on the objectives of the study. The problem stated is "A study to assess the effectiveness of tennis ball technique on sleeping pattern among obstructive sleep apnea patients at selected hospital, Chennai". The research design adopted in this study was quasi-experimental design with 60 samples. The study was done to obstructive sleep apnea patients, aged between 35 and 55 years who were at SIVA ENT hospitals, Royapet and Triplicane, Chennai.

5.1 Description of demographic variables among OSA patients based on frequency and percentage.

Demographic characteristics of patients which includes age, sex, BMI, religion, occupation, educational status, marital status, area of residence, presence of snoring, type of family, sleeping hours.

The study revealed that the experimental group, majority 14(46.67%) were in the age group of 41 – 45 years, 28(93.33%) were male, 12(40%) were in the BMI range of 18.5 – 25.0, 26(86.67%) were Hindus, 22(73.33%) were married, 13(43.33%) were graduate or post graduates, 14(46.67%) were skilled workers, 19(63.33%) were residing in urban area, almost all 30(100%) had the presence of snoring, 21(70%) belonged to nuclear family and 17(56.67%) were sleeping more during the day time. Whereas in the control group, 10(33.33%) were in age group of 35 – 40 and 41 – 45 years respectively, almost all 30(100%) were male, 14(46.67%) were in the BMI range of 18.5 – 25.0, 29(96.67%) were Hindus, 22(73.33%) were married, 15(50%) were graduate / post graduates, 14(46.67%) were skilled workers, 18(60%) were living in urban area, almost all 30(100%) had the presence of snoring, 16(53.335) belonged to nuclear family and 20(66.67%) were sleeping more during the day time.

5.2 The first objective of the study is to evaluate the effectiveness of Tennis ball technique among experimental group and control group.

The study revealed that in the experimental group pretest mean score and S.D was 17.20 and 7.05 and the post test mean score and S.D was 6.23 and 4.09. In control group pretest mean score and S.D was 19.30 and 2.38 and in the post test was 19.33 and 2.67.

The study revealed that the pretest and post test of the experimental group, the calculated paired 't' value t = 16.794 was found to be statistically highly significant at p<0.001 level. whereas in the control group the calculated paired 't' value t = -0.372 was not found to be statistically significant.

This clearly indicates that Tennis ball technique on sleeping pattern administered to patients with obstructive sleep apnea was found to be effective and there was significant improvement in their post test level of sleep pattern in the experimental group

This clearly concludes that planned teaching and demonstration on tennis ball technique on level of sleeping pattern among OSA patients was found to be effective in increasing the level of sleeping pattern in experimental than in control group.

Eijsvogel M.M., et al. (2015) investigated Sleep position trainer versus tennis ball technique in positional obstructive sleep apnea syndrome. 29 patients were treated with the Sleep Position Trainer (SPT), 26 patients with the Tennis Ball Technique (TBT). At baseline and 1 month poly somnography, Epworth Sleepiness Scale (ESS) and the Quebec Sleep Questionnaire (QSQ) were taken. Daily compliance was objectively measured in both group.The result concluded that in mild POSAS with normal EES the new SPT device and the standard TBT are equally effective in reducing respiratory indices. However, compared to the TBT, sleep quality, quality of life, and compliance improved significantly more in the SPT group.

Hence the research hypothesis **H_1 -"there is a significant difference within pre and post test level of sleeping pattern among obstructive sleep apnea patients in experimental and control group at p<0.001" was accepted.**

The calculated unpaired 't' value of t = 1.514 in the pretest between the experimental and control group was not found to be statistically significant and this clearly indicates that there was no difference in the pretest level of sleep pattern among patients with sleep apnea in the experimental and control group. Whereas the calculated unpaired 't' value of t = 14.667 in the post test between the experimental and control group was found to be statistically significant at p<0.001 level and this clearly indicates that there was significant difference in the post test level of sleep pattern among patients with sleep apnea in the experimental and control group.

Hence the research hypothesis **H_2 - "there is a significant difference between pre and post test level of sleeping pattern among obstructive sleep apnea patients in experimental and control group at p<0.001" was accepted.**

5.3 The second objective of the study is to associate the post- test level of sleeping pattern with the selected demographic variables in experimental group.

The study revealed that that the demographic variables age and BMI had shown statistically significant association with post test level of sleep pattern among obstructive sleep apnea patients at p<0.05 level and the other demographic variables had not shown statistically significant association with post test level of sleep pattern among obstructive sleep apnea patients in the experimental group.

Hence the research hypothesis **H_3 - "there is a significant association between the post test level of sleeping pattern in experimental group with the selected demographic variables" was accepted**

SUMMARY, CONCLUSION, IMPLICATIONS, RECOMMENDATIONS AND LIMITATIONS

This chapter deals with the summary, conclusion, implications, recommendations and limitations of the study.

6.1 SUMMARY

A person may have OSA after aging, due to obesity. There are some complications arising due to the OSA. One of them is oxygen de-saturation. Treating at initial stage of oxygen de-saturation is much easier and less cost effective. In this context, tennis ball technique has become a cheap and easily applicable method in reducing oxygen de-saturation developed during sleep, with enough evidences supporting it is a best treatment to reduce oxygen de-saturation and recommendation for further research tennis ball technique, the investigator had an intense curiosity to assess the effectiveness of tennis ball technique on sleeping pattern among obstructive sleep apnea patients thereby undertaking this study.

6.1.1 STATEMENT OF THE PROBLEM

A study to assess the effectiveness of tennis ball technique on sleeping pattern among obstructive sleep apnea patients at selected hospital, Chennai.

6.1.2 THE OBJECTIVES OF THE STUDY

- To evaluate the effectiveness of tennis ball technique on level of sleeping pattern among obstructive sleep apnea in the experimental group and control group.
- To find out the association between the post test levels of sleeping pattern among obstructive sleep apnea patients in the experimental group with their selected demographic variables.

6.1.3 The study was based on the assumption that

1. Patient with obstructive sleep apnea will have some amount of day time sleepiness.
2. Tennis ball technique will improve the level of sleeping pattern among obstructive sleep apnea patients.

6.1.4 The hypotheses formulated were

H_1: There is a significant difference within the pre and post test level of sleeping pattern in experimental and control group.

H_2: There is a significant difference between pre and post test level of sleeping pattern among obstructive sleep apnea patients in experimental and control group.

H_3: There is a significant association between the post test level of sleeping pattern in experimental group with the selected demographic variables.

The **Conceptual framework** adopted for this study was based on **Ludwing von Bertalarffy's** general system theory (1972) and review of literature searched on obstructive sleep apnea and Tennis ball technique.

The tool involves structured questionnaire to elicit the demographic variable and Insomnia severity sleep index scale was used to assess the level of sleeping pattern. Content validity was obtained from expert's, opinion and suggestions of experts were incorporated. The tool was assessed for reliability using test retest method r = 0.91 considered as a highly reliable for proceeding the main study.

A Pilot study was conducted to assess the feasibility, practicability of the study and 12 patients were selected who fulfilled the inclusive criteria. The intervention had an appreciable in increasing the level of sleeping pattern among obstructive sleep apnea patients. The tool was found feasible and the result of the pilot study showed miniature of the main result which was helpful to proceed for the main study.

A total of 60 obstructive sleep apnea patients who met the inclusion criteria were selected by purposive sampling technique. After getting the consent, the tennis ball technique was taught to participants in the experimental group. Routine hospital measures were followed for participants in control group. Post test level of sleeping pattern was assessed using insomnia severity index scale on 15^{th} day and data was analyzed using descriptive and inferential statistics.

The analysis reveals frequency and percentage of post test result shows in experimental group 3[50 %] has mild level of sleep and 3[50 %] has no sleep and in control group 3[50 %] has severe level of sleep and other 3[50 %] has moderate level of sleep.

6.1.5 The major findings of the study revealed that

The study revealed that the mean value of post test of experimental and control group was 13.33 and 35.66 respectively and the standard deviation value is 1.24 and 4.2 respectively, here the paired "t" value is 0.866 and the p value is < 0.001, these result shows that there is a significant improvement in the sleep pattern after providing tennis ball technique.

There was a significant association in post test level of sleeping pattern in experimental group with age and BMI of patients with obstructive sleep apnea.

6.2 CONCLUSION

The study assessed the effectiveness of tennis ball technique on sleeping pattern among obstructive sleep apnea patients. The results of the study concluded that tennis ball technique was effective in improving the sleeping pattern among obstructive sleep apnea patients, which is an important contribution to prevent obstructive sleep apnea complications and enhances the quality of sleep at night times.

6.3 IMPLICATIONS

The investigator has drawn the following implications from the study, which is of vital concern in the field of nursing practice, nursing education, nursing administration, and nursing research.

6.3.1 NURSING PRACTICE

- The nurse should develop practice of tennis ball technique on sleeping pattern to improve the oxygen saturation among obstructive sleep apnea patients.
- The nurse should understand the importance of tennis ball technique as an adjacent to pharmacological therapy in nursing practice.
- The nurse should teach the benefits of tennis ball technique to improve the sleeping pattern among obstructive sleep apnea patients in hospitals.
- Nursing staff can take specialized training in adjunct treatment to prevent complications among obstructive sleep apnea patients.

6.3.2 NURSING RESEARCH

- More research can be done to establish effectiveness of tennis ball technique throughout the world.
- Disseminate the findings through conferences, seminar, and publications in professional, national, and international journals.
- The generalization of study result can be made by further replication of the study.
- Oxygen de-saturation can be reduced with the help of tennis ball technique is one of the evidence developed for future references.

6.3.3 NURSING EDUCATION

- A continuing nursing education program can be arranged on tennis ball technique and obstructive sleep apnea.
- Tennis ball technique is a non pharmacological intervention than can be integrated with nursing practice.
- In service education can be given to staff nurses and faculty members regarding tennis ball technique, and obstructive sleep apnea.
- A nurse educator should encourage the students for effective utilization of results of research for their evidence based practice related to tennis ball technique on obstructive sleep apnea patients.

6.3.4 NURSING ADMINISTRATION

- The Nurse administrator should create awareness of importance and benefits of Tennis ball technique.
- Tennis ball technique is one of the cost effective intervention for obstructive sleep apnea patients, so arrangements can be made for its preparation and use in ENT department.
- Nurse administrators can get the co operation from the ENT department in performing tennis ball technique.

6.4 RECOMMENDATIONS

Based on findings of the study the investigator proposed the following recommendations:

- The study can be conducted for a large group.
- The same study can be conducted at different settings to generalize the study findings.
- The similar study can be done with In-patients
- Comparative study may be conducted with In-patients and Out-patients.

6.5 LIMITATIONS

- The study limited to a period for four weeks.
- The investigator found difficulty in getting adequate literature related to tennis ball technique.

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VENKATESWARA NURSING COLLEGE

(A unit of VELS Group, Pallavaram)

Approved by Indian Nursing Council, (Cert. No. 18-29/3458-INC) and Tamil Nadu Nurses & Midwives Council
Affiliated to The Tamil Nadu Dr. M.G.R. Medical University
Thalambur, Off Old Mahabalipuram Road, Near Navalur, Chennai - 600 130
Phone : (91-44) 3253 7098 / 2743 5060 Fax : (91-44) 2743 5059

Institutional Ethical Committee **03.07.2017**

Certificate of Approval

To

Mrs. D. Jasmine Subala.,
M.Sc (N) - I Year,
Venkateswara Nursing College,
Thalambur, Chennai- 600130.

Dear Mrs. D. Jasmine Subala,

The Institutional Ethical Committee of Venkateswara Nursing College reviewed and discussed your application for the approval of the proposal entitled **"An experimental study to assess the effectiveness of tennis ball technique on sleeping pattern among obstructive sleep Apnea patient at selected hospital, Chennai."**

The following members of the Ethical committee were present in the meeting held on 03.07.2017 conducted at Venkateswara Nursing College, Chennai- 600130.

1. Dr. D. Parthasarathy, Special Officer – Vels University – Chair Person
2. Dr. Ciby Jose, Principal, Venkateswara Nursing College- Executive Member Secretary
3. Mr. C. Saravanan, Advocate, Legal Expert – Member
4. Dr.Irin Praveen, Vice – Principal, Venkateswara Nursing College – Member
5. Mrs. Prathiba Sivakumar, HOD in Medical Surgical Nursing – Member
6. Mrs. Punithavathi.I, HOD in Child Health Nursing – Member
7. Mrs.Sumathi.C, HOD in Obstetric & Gynaecological Nursing – Member
8. Prof. W. Vimala, HOD in Mental Health Nursing – Member
9. Mrs. J. Lakshmi, HOD in Community Health Nursing – Member
10. Mr. D. Sathish, Social Science Representative – Member
11. Dr. Balasubramanian.N.K, Statistician – Member

We approve the proposal to be conducted in its presented form.

The Institutional Ethical Committee expects to be informed about the progress of the study, any changes in the protocol and submit a copy of the final report.

Executive Member Secretary, Ethical committee

Principal
Venkateswara Nursing College
Thalambur,
Chennai - 600 130

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Phone : (91-44) 3253 7098 / 2743 5060 Fax : (91-44) 2743 5059

VNC/TH/17/2018 30.01.2018

To

Dr. Kumaresan, MBBS, DLO, MS – ENT.
Director,
Siva ENT Hospital,
159, Avvai Shanmugam Salai,
Royapet,
Chennai – 600014.

Respected Sir/Madam

Subject : Permission for conducting research study in your esteemed institution - 4Weeks - req - reg:-

This is to bring to your kind notice that Ms. Jasmine Subala. D, M.Sc Nursing II year student of Venkateswara Nursing College have to do a dissertation work for a period of 4 weeks, to be submitted to The Tamil Nadu Dr.MGR Medical University, Chennai as a partial fulfillment for the award of Master of Science in Nursing.

The topic is **"A study to assess the effectiveness of Tennis Ball Therapy on sleeping pattern among Obstructive Sleep Apnea patients at selected hospital, Chennai".** In this regard we request you to kindly permit her to use your esteemed institution to do her study. I assure that she would abide by the rules and regulation of your institution. Kindly do the needful at the earliest.

Thanking you,

Yours faithfully,

Dr. M. KUMARESAN, M.S., D.L.O.
Managing Director
SIVA E. N. T. HOSPITAL (PVT) LTD
94, LLOYDS ROAD,
MADRAS 600 014
PHONE, 846045

PRINCIPAL
VENKATESWARA NURSING COLLEGE
THALAMBUR
CHENNAI-600 130

City Admin. Office :#521/2, Anna Salai, (Opp. G.R. Complex) Nandanam, Chennai - 600 035
Phone / Fax :(91-44) 2431 5541 / 2431 5542

VENKATESWARA NURSING COLLEGE

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Thalambur, Off Old Mahabalipuram Road, Near Navalur, Chennai - 600 130
Phone : (91-44) 3253 7098 / 2743 5060 Fax : (91-44) 2743 5059

VNC/TH/18/2018 30.01.2018

To

Dr. Navin Kumaresan, MBBS, MS,
Managing Director,
Siva ENT Hospital,
295, Triplicane High Road,
Triplicane,
Chennai– 600 005.

Respected Sir/Madam

Subject : Permission for conducting research study in your esteemed institution - 4Weeks - req - reg:-

This is to bring to your kind notice that Ms. Jasmine Subala. D, M.Sc Nursing II year student of Venkateswara Nursing College have to do a dissertation work for a period of 4 weeks, to be submitted to The Tamil Nadu Dr.MGR Medical University, Chennai as a partial fulfillment for the award of Master of Science in Nursing.

The topic is **"A study to assess the effectiveness of Tennis Ball Therapy on sleeping pattern among Obstructive Sleep Apnea patients at selected hospital, Chennai".** In this regard we request you to kindly permit her to use your esteemed institution to do her study. I assure that she would abide by the rules and regulation of your institution. Kindly do the needful at the earliest.

Dr. Navin Kumaresan Thanking you,

Yours faithfully,

Dr. M. KUMARESAN., M.S., DLO.,
Managing Director
SIVA E.N.T. HOSPITAL PVT. LTD.
No.159, Lloyds Road, Royapettah,
Chennai - 600 014. Ph: 2811 6807

PRINCIPAL
VENKATESWARA NURSING COLLEGE
THALAMBUR
CHENNAI-600 130

City Admin. Office :#521/2, Anna Salai, (Opp. G.R. Complex) Nandanam, Chennai - 600 035
Phone / Fax :(91-44) 2431 5541 / 2431 5542

17.01.2018

From

Ms. Jasmine Subala.D,
M.Sc (N) II Year,
Venkateswara Nursing College,
Thalambur, Chennai–600 130.

To

Dr. Kumaresan,
Siva ENT Hospital,
159, Avvai Shanmugam Salai,
Royapet,
Chennai–600014.

Respected Sir/ Madam,

Sub: Permission for conducting research study in your esteemed institution - 5 Weeks - req - reg :-

I Ms. Jasmine Subala.D, M.Sc Nursing II year student of Venkateswara Nursing College have to do a dissertation work for a period of 5 weeks, to be submitted to The Tamil Nadu Dr.MGR Medical University, Chennai as a partial fulfillment for the award of Master of Science in Nursing.

The topic of my study is "A study to assess the effectiveness of Tennis Ball Therapy on sleeping pattern among Obstructive Sleep Apnea patients at a selected hospital, Chennai." In this regard I request you to kindly permit me to use your esteemed institution to do my study. Kindly do the needful at t he earliest.

Thanking you,

Yours faithfully,

(Ms.Jasmine Subala.D)

Forwarded
17/1/18
HOD Medical Surgical Nursing
Venkateswara Nursing College
Thalambur, Chennai-600 130

Dr. M. KUMARESAN., M.S.,D.L.O.,
Managing Director
SIVA E.N.T. HOSPITAL PVT. LTD.
No. 94, Lloyds Road, Royapettah,
Chennai-600 014. Ph: 2826 0451

APPENDIX - C

REQUISITION LETTER FOR CONTENT VALIDITY

From.

Mrs. Jasmine Subala. D,
M.Sc. Nursing II Year,
Venkateswara Nursing College,
Thalambur,Chennai – 130.

To.

Respected Sir/Madam,

Sub: Requisition for Expert Opinion for Content Validity.

I am a M.Sc (Nursing) Second Year student studying in Venkateswara Nursing College, Thalambur, Chennai, under "The TamilNadu Dr. M.G.R. Medical University". I would like to conduct **"Effectiveness of tennis ball technique on sleeping pattern among obstructive sleep apnea patients at a selected hospital, Chennai."**

Here with I am sending the developed tool for the content validity for your opinion and possible suggestions, I would be most obligated if you can do the needful.

Thanking You,

Yours Faithfully,

Mrs. Jasmine Subala.D

Enclosure:

1. Research proposal
2. Research score and scoring key
3. Intervention tool
4. Certificate for content validity
5. Self addressed envelope.

LIST OF EXPERTS FOR CONTENT VALIDITY

MEDICAL EXPERTS:

1. **Dr. Kumaresan. M., M.S.(ENT),D.L.O.,**
   Director,
   Siva ENT hospital ,
   159, Loyds Road, Royapettah,
   Chennai -600014.
2. **Dr. Naveen Kumaresan., MBBS, MS.,**
   Managing Director,
   Siva ENT hospital ,
   295, Triplicane High Road,
   Triplicane, Chennai, 600 005.

MEDICAL SURGICAL NURSING EXPERTS:

1. **Mrs. Sasikala, M.Sc.(N),**
   Professor,
   Omayal Achi College of Nursing,
   Puzhal, Chennai -600 066.

2. **Dr. S. Punitha Josephine, M.Sc. (N), PhD,**
   Vice Principal,
   Karpaga Vinayaga College of Nursing,
   Kanchepuram.

3. **Mrs. Stella, M.Sc. (N),**
   Professor,
   Mohammed Sathak AJ College of Nursing,
   24, Rajiv Gandhi Road (OMR),
   IT Highway, Siruseri – 600 103.

4. **Mrs. Kavitha Mani, M.Sc. (N),**
   Professor,
   MMM College of Nursing,
   No.131, Sakthi Nagar, Nolambur,
   Mougappair west, Chennai – 600 095.

STATISTICICIAN:

1. **Mr. Balasubramaniyam**
   Statistician,
   Venkateswara Nursing College,
   Thalambur, Chennai – 600130.

CERTIFICATE FOR THE CONTENT VALIDITY

This is to certify that the data collection tool developed by Mrs. Jasmine Subala.D, doing M.Sc (N) II year at Venkateswara Nursing College under The Tamilnadu Dr. M.G.R Medical University for her study entitled **"A study to assess the effectiveness of Tennis Ball Technique on sleeping pattern among Obstructive Sleep Apnea patients at selected hospital, Chennai "** under the guideship of Mrs.Prathiba Sivakumar, HOD – Medical Surgical Nursing, Venateswara Nursing College, Thalambur, Chennai.

Name and designation:

Signature with date:

Seal:

M. KUMARESAN, M.S.,D
Managing Director
SIVA E. N. T. HOSPITAL (PVT) LTD,
94, LLOYDS ROAD,
MADRAS

CERTIFICATE FOR THE CONTENT VALIDITY

This is to certify that the data collection tool developed by Mrs. Jasmine Subala.D, doing M.Sc (N) II year at Venkateswara Nursing College under The Tamilnadu Dr. M.G.R Medical University for her study entitled **"A study to assess the effectiveness of Tennis Ball Technique on sleeping pattern among Obstructive Sleep Apnea patients at selected hospital, Chennai "** under the guideship of Mrs.Prathiba Sivakumar, HOD – Medical Surgical Nursing, Venateswara Nursing College, Thalambur, Chennai.

Name and designation:
Dr. NAVIN KUMARESAN

Signature with date:

Seal:

5.4.18

Dr. M. KUMARESAN., M.S., DLO.,
Managing Director
SIVA E.N.T. HOSPITAL PVT. LTD.
No.159, Lloyds Road, Royapettah,
Chennai - 600 014. Ph: 2811 6807

CERTIFICATE FOR THE CONTENT VALIDITY

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4/01/18

Signature with date

Seal:

OMAYAL ACHI COLLEGE OF NURSING
No. 45, Ambattur Road,
PUZHAL,
CHENNAI-600 066

CERTIFICATE FOR THE CONTENT VALIDITY

This is to certify that the data collection tool developed by Mrs.Jasmine Subala.D doing M.Sc (N) II Year at Venkateshwara Nursing College under The Tamilnadu Dr. M.G.R Medical University for her study entitled " A study to assess the effectiveness of Tennis Ball Therapy on sleeping pattern among obstructive sleep apnea patients at selected hospital ,Chennai " under the guideship of Mrs.Prathiba sivakumar, Professor , Venkateshwara Nursing College,Thalambur,Chennai.

8.2.2018
Signature with date

Dr.S.PUNITHA JOSEPHINE. Ph.D(N)
Seal

Vice Principal
Kaipaga vinayaga
college of nursing
Kancheepuram -01.

CERTIFICATE FOR THE CONTENT VALIDITY

This is to certify that the data collection tool developed by Mrs. Jasmine Subala.D, doing M.Sc (N) II year at Venkateswara Nursing College under The Tamilnadu Dr. M.G.R Medical University for her study entitled **"A study to assess the effectiveness of Tennis Ball Technique on sleeping pattern among Obstructive Sleep Apnea patients at selected hospital, Chennai "** under the guideship of Mrs.Prathiba Sivakumar, HOD – Medical Surgical Nursing, Venateswara Nursing College, Thalambur, Chennai.

Name and designation: Mrs. Stella Mary,
Professor.

Signature with date: 23/10/18

Seal: MOHAMED SATHAK
A.J. COLLEGE OF NURSING
34, RAJIV GANDHI ROAD (OMR)
IT HIGHWAY, SIRUSERI, CHENNAI-603 103

CERTIFICATE FOR THE CONTENT VALIDITY

This is to certify that the data collection tool developed by Mrs. Jasmine Subala.D, doing M.Sc (N) II year at Venkateswara Nursing College under The Tamilnadu Dr. M.G.R Medical University for her study entitled **"A study to assess the effectiveness of Tennis Ball Therapy on sleeping pattern among Obstructive Sleep Apnea patients at selected hospital, Chennai "** under the guideship of Mrs.Prathiba Sivakumar, HOD – Medical Surgical Nursing, Venateswara Nursing College, Thalambur, Chennai.

21/1/2018

Signature with date

Seal:

MMM COLLEGE OF NURSING
No. 131, Sakthi Nagar, Nolambur,
Mogappair West, Chennai - 600 095
Tamil Nadu

CERTIFICATE FOR THE CONTENT VALIDITY

This is to certify that the data collection tool developed by Mrs. Jasmine Subala. D, doing M.Sc. (N) II year at Venkateswara Nursing College under The Tamil Nadu Dr. M.G.R Medical University for her study entitled **"A study to assess the effectiveness of Tennis Ball Therapy on sleeping pattern among Obstructive Sleep Apnea patients at selected hospital, Chennai"** under the guideship of Mrs. Prathiba Sivakumar, HOD – Medical Surgical Nursing, Venateswara Nursing College, Thalambur, Chennai.

Signature with date 23/7/2018

Seal:

Dr. N. K .BALASUBRAMANIAN
Retired Professor, Biostatistics
D4, Priya Tower, L&T Service Station Road
Mugalivakkam, Chennai - 600125
Mob : 9566143520
email:balamanidhanam@gmail.com

CERTIFICATE FOR ENGLISH EDITION

TO WHOM IT MAY CONCERN

This is to certify that the dissertation work **"A study to assess the effectiveness of tennis ball technique on sleeping pattern among obstructive sleep apnea patients at selected hospitals, Chennai"** done by **Mrs.Jasmine Subala.D,** M.Sc (Nursing) II year student of Venkateswara Nursing college, Thalambur, has been edited by me and the use of English in this dissertation is found appropriate.

Signature : S. Salma

Name : S. SALMA M.A, M.phil, B.Ed

Seal :

Date : தேதி: 30/7/18

CERTIFICATE FOR TAMIL EDITION

TO WHOM IT MAY CONCERN

This is to certify that the Research instruments/tools in Tamil used in this dissertation work **"A study to assess the effectiveness of tennis ball technique on sleeping pattern among obstructive sleep apnea patients at selected hospitals, Chennai"** done by **Mrs.Jasmine Subala.D,** M.Sc (Nursing) II year student of Venkateswara Nursing college, Thalambur, Chennai, has been edited by me and the use of Tamil in this dissertation is found appropriate.

Signature : ஏ.ஜ. உமாமகேஸ்வரி

Name : ஏ.ஜ. உமாமகேஸ்வரி M.A. B.Ed. M.Phil.

Seal :

Date : 30/2/18

சி.ராமசாமி முதலியார் மேனிலைப் பள்ளி
அம்பத்தூர், சென்னை-53.

APPENDIX - E

INFORMED CONSENT REQUEST FORM

Good morning,

I Mrs. Jasmine Subala. D, M.Sc (Nursing) II year student from Venkateswara Nursing College, Chennai, conducting **" A study to assess effectiveness of tennis ball technique on sleeping pattern among obstructive sleep apnea patients at a selected hospital, Chennai"** as a partial fulfillment of the requirement for the degree of M.Sc. Nursing under the Tamil Nadu Dr.M.G.R. Medical University

I assure you that the information provided by you will be kept confidential. So, I request you to kindly cooperate with me and participate in this study by giving your frank and honest response throughout the study.

Thanking you,

Signature of the investigator

(Jasmine Subala .D)

INFORMED CONSENT FORM

Participant's Name :

Participant's identification number for this study :

I understand that I am being asked to participate in a research study conducted by Mrs.Jasmine Subala.D, M.Sc (Nursing) II year student from Venkateswara Nursing College, Chennai. This study will evaluate the **"effectiveness of tennis ball technique on sleeping pattern among obstructive sleep apnea patients at a selected hospital, Chennai"** If I agree to participate in the study, I will be given structured questionnaire to know the demographic variable and the investigator will observe my level of self esteem using a standard questionnaire. The answers will be kept confidential. No identifying information will be included during the analysis process. I understand that there are no risk associated with this study.

I realize that my participation in this study is entirely voluntary and I may withdraw from the study at any time I wish If I decide to discontinue my participation in this study, I will be continued to be treated in the usual and customary fashion.

I understand that all information will be kept confidential. However, this information may be used in nursing publication or presentations. If I need to, I can contact, Mrs. Jasmine Subala, M.Sc (Nursing) II year, Venkateswara Nursing College, Thalambur, Chennai (phone no: 044-32577098) at any time during the study. The study has been explained to me. I have read and understood the consent form, my entire question has been answered and I agree to participate. I understand that I will be given a copy of this signed consent form.

Signature of the Participant Signature of the Investigator

Date Date

APPENDIX - G

TOOLS FOR DATA COLLECTION

PART - I

1. Age

a) 35-40 Years

b) 41-45 Years

c) 46-55 Years

d)56-65 Years

2. Sex

a) Male

b) Female

3. BMI

a) <18.5

b) 18.5-25

c) 26-30

d) >30

4. Religion

a) Hindu

b) Muslim

c) Christian

d) Others

5. Marital Status

a) Married

b) Single

c) Widow/Widower

d) Divorced

6. Educational status

a) Graduate / Post Graduate

b) Intermediate / Post high school diploma high school

c) Middle school

d) Primary

e) Illiterate

7. Occupation

a) Skilled

b) Semi-skilled

c) Unskilled

d) Unemployed

8. Area of Residence

a) Urban

b) Rural

c) Semi - Urban

9. Presence of Snoring

a) Yes

b) No

10. Type of family

a) Nuclear family

b) Joint family

c) Extended family

d) Others

11. Sleeping hours more

a) Day time

b) Night time

PART - II

Insomnia Severity Index Scale

Insomnia Problem	None	Mild	Moderate	Severe	Very Severe
1. Difficulty falling asleep	0	1	2	3	4
2. Difficulty staying asleep	0	1	2	3	4
3. Problems waking up too early	0	1	2	3	4

4. How SATISFIED/DISSATISFIED are you with your CURRENT sleep pattern?

Very Satisfied	Satisfied	Moderately Satisfied	Dissatisfied	Very Dissatisfied
0	1	2	3	4

5. How NOTICEABLE to others do you think your sleep problem is in terms of impairing the quality of your life? Not at all

Noticeable	A Little	Somewhat	Much	Very Much Noticeable
0	1	2	3	4

6. How WORRIED/DISTRESSED are you about your current sleep problem? Not at all

Worried	A Little	Somewhat	Much	Very Much Worried
0	1	2	3	4

7. **To what extent do you consider your sleep problem to INTERFERE with your daily functioning (e.g. daytime fatigue, mood, ability to function at work/daily chores, concentration, memory, mood, etc.) CURRENTLY? Not at all**

Interfering	A Little	Somewhat	Much	Very Much Interfering
0	1	2	3	4

SCORING AND INTERPRETATION:

CATEGORIES	**SCORE**
No clinically significant insomnia	0–7
Sub threshold insomnia	8–14
Clinical insomnia (moderate severity)	15–21
Clinical insomnia (severe)	22–28

APPENDIX – H

RESEARCH INSTRUMENTS IN TAMIL

ஆய்வில் பங்கேற்ப்பதற்கான கோரிக்கை படிவம்

வணக்கம்,

என் பெயர் ஜாஸ்மின் சுபலா, நான் வெங்கடேஸ்வரா செவிலியர் கல்லூரியில் பட்ட மேற்படிப்பு படித்து வருகிறேன். என் படிப்பின் ஒரு பகுதியாக "சென்னையில் தேர்ந்தெடுக்கப்பட்ட மருத்துவமனையில் அனுமதிக்கப்பட்ட தூக்கமின்மை சார்புடைய நோயாளிகளிடையே தூக்கத்தை அதிகரிக்கும் நோக்கில் டென்னிஸ் பந்தின் பயன்பாட்டு நுட்பத்தின் செயல்திறனை மதிப்பிடுவதற்கான ஒரு ஆய்வு" செய்கிறேன்.

நீங்கள் ஆய்வின் போது தெரிவிக்கப்படும் தகவல்கள் அனைத்தும் முறையாக பாதுகாக்கப்படும் என்று உறுதியளிக்கிறேன். எனவே இந்த ஆய்வில் நீங்கள் பங்கு பெற்று கேட்கப்படும் கேள்விகளுக்கு உங்களின் நேர்மையான மற்றும் வெளிப்படையான கருத்துகளை தெரிவித்து ஆய்விற்கு ஒத்துழைக்குமாறு அன்போடு கேட்டுக்கொள்கிறேன்.

நன்றி

இப்படிக்கு ஆராய்ச்சியாளர்,

ஜாஸ்மின் சுபலா

ஆய்வில் பங்கேற்பதற்கான ஒப்புதல் படிவம்

பங்கேற்பாளரின் பெயர் :

பங்கேற்பாளரின் குறியீட்டு என் :

ஆராய்ச்சியின் தலைப்பு : "சென்னையில் தேர்ந்தெடுக்கப்பட்ட மருத்துவமனையில் அனுமதிக்கப்பட்ட தூக்கமின்மை சார்புடைய நோயாளிகளிடையே தூக்கத்தை அதிகரிக்கும் நோக்கில் டென்னிஸ் பந்தின் பயன்பாட்டு நுட்பத்தின் செயல்திறனை மதிப்பிடுவதற்கான ஒரு ஆய்வு" செய்கிறேன்.

வெங்கடேஸ்வரா செவிலியர் கல்லூரியில் பட்ட மேற்படிப்பு இரண்டாம் ஆண்டு பயிலும் மாணவர் ஜாஸ்மின் சுபலா, நடத்தும் ஆய்வில் பங்கேற்குமாறு கேட்டுக்கொள்ளப்பட்டுள்ளேன். நான் இந்த ஆய்வில் பங்கேற்கும் பட்சத்தில், நிலையான கேள்வி தாள் மூலம் கேட்கப்படும் கேள்விகளுக்கு நேர்மையான மற்றும் வெளிப்படையான கருத்துகளை தெரிவிப்பேன். என் தகவல்கள் அனைத்தும் ரகசியமாக வைக்கப்படும். பகுப்பாய்வு செயல்முறையின் போது என்னை அடையாளம் காணும் தகவல்கள் எதுவும் சேர்க்கப்படாது. இந்த ஆய்வில் எந்த ஆபத்தும் இல்லை என்று நான் புரிந்துகொண்டேன்.

இந்த ஆய்வில் எனது பங்களிப்பு முற்றிலும் தன்னிச்சையானது. மேலும் நன் விரும்பும் பட்சத்தில் எப்போது வேண்டுமானாலும் இந்த ஆய்வில் இருந்து விலகலாம் என்று தெரிந்து கொண்டேன். நான் இந்த ஆய்வில் பங்கேற்ப்பதை நிறுத்துவதற்க்கு முடிவு செய்தால், வழக்கமாக நான் பெரும் சிகிச்சைகளை தொடர்ந்து பெறலாம் என்றும் அறிந்து கொண்டேன்.

இந்த ஆய்வின் தகவல்கள், செவிலியம் சார்ந்த வெளியீடுகள் மற்றும் விளக்க காட்சிகளில் பயன்படுத்தப்படலாம்.

நான் ஒப்புதல் படிவத்தை புரிந்துகொண்டேன், இந்த ஆய்வு பற்றிய அணைத்து தகவல்களும் எனக்குத் தெரிவிக்கப்பட்டது. எனது சந்தேகங்களும் தெளிவடைந்தது. இந்த ஒப்புதல் படிவத்தின் நகல் எனக்கு வழங்கப்படும் என்றும் அறிந்து இந்த ஆய்வில் பங்கேற்க என் முழு மனதுடன் ஒப்புக்கொள்கிறேன்.

பங்கேற்ப்பாளரின் கையொப்பம்

தேதி

ஆராய்ச்சியாளரின் கையொப்பம்

தேதி

பிரிவு – அ - சமூக காரணிகள்

1. வயது –
2. பாலினம் -
3. உடல் நிறை குறியீடு -
4. மதம் -
5. திருமண நிலை -
6. கல்வி தகுதி -
7. தொழில் -
8. குடியிருப்பு பகுதி -
9. குறட்டை தொந்தரவு உண்டா? –
10. குடும்ப வகை –
11. அதிகமாக உறங்கும் வேளை -

தூக்கமின்மையின் தீவிரத்தன்மை குறியீடு

1. **உறக்கம் வருவதில் சிரமம் உண்டா ?**

(அ) இல்லை (ஆ) லேசாக (இ) மிதமாக (ஈ) கடுமையாக (உ) மிகவும் கடுமையாக

2. **ஆழந்த உறக்கம் ஏற்படுவதில் சிரமம் உண்டா ?**

(அ) இல்லை (ஆ) லேசாக (இ) மிதமாக (ஈ) கடுமையாக (உ) மிகவும் கடுமையாக

3. **தூக்கத்திலிருந்து மிக விரைவில் எழுவதில் சிரமம் உண்டா?**

(அ) இல்லை (ஆ) லேசாக (இ) மிதமாக (ஈ) கடுமையாக (உ) மிகவும் கடுமையாக

4. **உங்கள் தற்போதைய தூக்க முறை எப்படி இருக்ககிறது ?(திருப்த்தி அளிக்கிறதா / இல்லையா)**

(அ) மிகவும் திருப்தி (ஆ) திருப்தி (இ) மிதமான திருப்தி (ஈ) திருப்தியற்றது (உ) மிகவும் அதிருப்தி

5. **உங்கள் உறக்கப்பிரச்சனையினால் உங்கள் வாழ்க்கை நிம்மதி இல்லாமல் இருப்பதை மற்றவர்கள் எப்படி கவனிக்கிறார்கள் ?**

(அ) குறிப்பிடத்தக்க அளவு கவனிக்கிறார்கள் (ஆ) சிறிய அளவு கவனிக்கிறார்கள் (இ) சற்றே கவனிக்கிறார்கள் (ஈ) மிகவும் கவனிக்கிறார்கள் (உ) மிகவும் குறிப்பிடத்தக்க அளவு கவனிக்கிறார்கள்.

6. **உங்களது தற்போதைய தூக்க முறையினால் உங்களுக்கு எவ்வளவு துன்பம்/கவலை ஏற்படுகிறது?**

(அ) கவலை இல்லை (ஆ) ஒரு சிறிய கவலை (இ) சற்றே கவலை (ஈ) மிகவும் கவலை (உ) பெரும் கவலை

7. **உங்களின் தூக்கமின்மை பிரச்சனை உங்களது தினசரி செயல்பாடுகளை எந்த அளவிற்கு பாதிக்கிறது ?**

(அ) பாதிப்பு இல்லை (ஆ) ஒரு சிறிய பாதிப்பு (இ) சற்றே பாதிப்பு (ஈ) மிகவும் பாதிப்பு (உ) பெரும் பாதிப்பு

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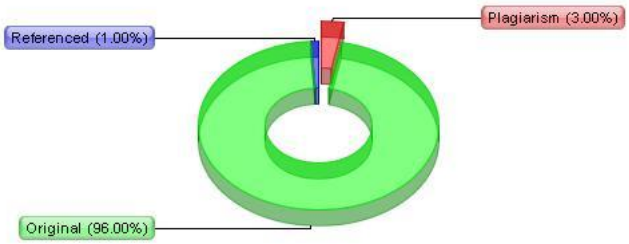

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APPENDIX - J

CODING FOR DEMOGRAPHIC VARIABLES

Section A:

Socio demographic variables	**Code**
1. Age	
a) 35-40 Years	1
b) 41-45 Years	2
c) 46-55 Years	3
d)56-65 Years	4
2. Sex	
a) Male	1
b) Female	2
3. BMI	
a) <18.5	1
b) 18.5-25	2
c) 26-30	3
d) >30	4
4. Religion	
A) Hindu	1
b) Muslim	2
c) Christian	3
d) Others	4
5. Marital Status	
a) Married	1
b) Single	2
c) Widow/Widower	3
d) Divorced	4

6. Educational status

a) Graduate / Post Graduate	1
b) Intermediate / Post high school diploma high school	2
c) Middle school	3
d) Primary	4
e) Illiterate	5

7. Occupation

a) Skilled	1
b) Semi-skilled	2
c) Unskilled	3
d) Unemployed	4

8. Area of Residence

a) Urban	1
b) Rural	2
c) Semi – Urban	3

9. Presence of Snoring

a) Yes	1
b) No	2

10. Type of family

a) Nuclear family	1
b) Joint family	2
c) Extended family	3
d) Others	4

11. Sleeping hours more

a) Day time	1
b) Night time	2

APPENDIX – L

LESSON PLAN ON TENNIS BALL TECHNIQUE

CENTRAL OBJECTIVE:

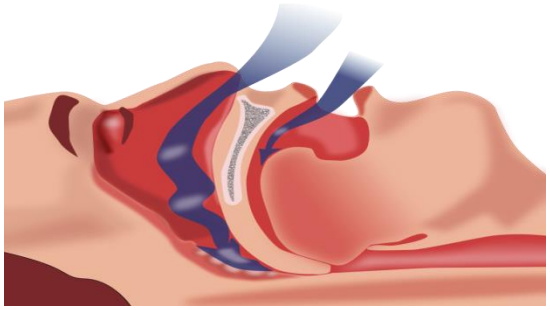
At the end of the class the patients will be able to understand about tennis ball technique and to follow this in there home setting.

SPECIFIC OBJECTIVE

At the end of the class the patients will be able to

- ✓ To know about obstructive sleep apnea
- ✓ To recall what is tennis ball technique
- ✓ To understand the relation between OSA and TBT
- ✓ To identify the Reason to use TBT
- ✓ To realize the advantage of TBT

S.NO	TIME	OBJECTIVE	CONTENT	AV-AIDS
1.	5 min	At the end of the class the patient will be able to know about OSA	Obstructive sleep apnea (OSA) is the most common type of sleep apnea and is caused by complete or partial obstructions of the upper airway. It is characterized by repetitive episodes of shallow or paused breathing during sleep, despite the effort to breathe, and is usually associated with a reduction in blood oxygen saturation. These episodes of decreased breathing, called "apneas" (literally, "without breath"), typically last 20 to 40 seconds Individuals with OSA are rarely aware of difficulty breathing, even upon awakening. It is often recognized as a problem by others who observe the individual during episodes or is suspected because of its effects on the body. OSA is commonly accompanied with snoring. Some use the terms obstructive sleep apnea syndrome or obstructive sleep apnea–hypopnea syndrome to refer to OSA which is associated with symptoms during the daytime.[2] Symptoms may be present for years or even decades without identification, during which time the individual may become conditioned to the daytime sleepiness and fatigue associated with significant levels of sleep disturbance. Individuals who generally sleep alone are often unaware of the condition, without a regular bed-partner to notice and make them aware of their symptoms.	Power point presentation



As the muscle tone of the body ordinarily relaxes during sleep, and the airway at the throat is composed of walls of soft tissue, which can collapse, it is not surprising that breathing can be obstructed during sleep. Although a minor degree of OSA is considered to be within the bounds of normal sleep, and many individuals experience episodes of OSA at some point in life, a small percentage of people have chronic, severe OSA.

Many people experience episodes of OSA for only a short period. This can be the result of an upper respiratory infection that causes nasal congestion, along with swelling of the throat, or tonsillitis that temporarily produces very enlarged tonsils. The Epstein-Barr virus, for example, is known to be able to dramatically increase the size of lymphoid tissue during acute infection, and OSA is fairly common in acute cases of severe infectious mononucleosis. Temporary spells of OSA syndrome may also occur in individuals who are under the influence of a

			drug (such as alcohol) that may relax their body tone excessively and interfere with normal arousal from sleep mechanisms.	
2.	5 min	At the end of the class the patients will able to recall what is TBT	Tennis Ball Technique is a simple method of positional therapy that helps in avoiding sleeping on the back. It was first introduced in the early 1980s. A tennis ball is fastened to the back with a belt or strap. This makes sleeping on your back uncomfortable. Soft tissue in the throat is less likely to collapse and block the airway while sleeping on the sides. As a result positional therapy may help reduce the breathing pauses that occur to patients with obstructive sleep apnea. It is a method used to prevent supine posture during sleep with a help of cloth strip inserting tennis ball on the back. 	Power point presentation
3.	5min	At the end of the class the patients will be	Obstructive sleep apnea (OSA) is a common disorder that leads to complex metabolic and inflammatory derangements that cause or contribute to increased morbidity and mortality. Effective treatment of OSA leads to improvements in co	Power point presentation

		able to understand the relation between OSA and TBT	morbid disease states, mortality, accident rate, and quality of life. Furthermore, treatment of OSA has been shown to reduce health care dollar expenditures. Position modification treatment of OSA is certainly an attractive option from the standpoint of cost effectiveness. However, the poor long-term compliance rates with TBT and now SPT are concerning. Various techniques for positional training exist, including a variety of alarm systems and padded devices to hinder supine sleep, that are not reimbursed by the majority of insurance carriers. The out of pocket patient cost for such devices places additional impediment to compliance.	
4.	5min	At the end of the class the patients will be able to identify the Reason to use TBT	1. Positional therapy is the avoidance of the supine posture during sleep for patients with supine-related sleep apnea. Approximately half of obstructive sleep apnea (OSA) patients are positional (i.e., the majority of their breathing abnormalities during sleep appear in the supine posture). 2. To avoiding the supine posture during sleep positional therapy (TBT) is a valuable form of therapy for these patients. 3. This therapy is mainly suitable for patients with supine-related sleep apnea (positional patients) who have most of their breathing abnormalities concentrated in the supine posture, and in whom while sleeping in the lateral postures (and sometimes in the prone posture), the amount of breathing abnormalities is significantly reduced to a no pathological level.	Power point presentation

5.	5 min	At the end of the class the patients will be able to realise the advantage of TBT	1. Cost effective 2. Easy method 3. Assessable 4. Affordable 5. Convenient	Power point presentation

Conclusion:

So far we have discussed about OSA, TBT, and its uses. I hope you have understand about TBT. I thank the administration for making place for this class and I thank all the listeners (patients) for the patent and spending there valuable time in listening this.

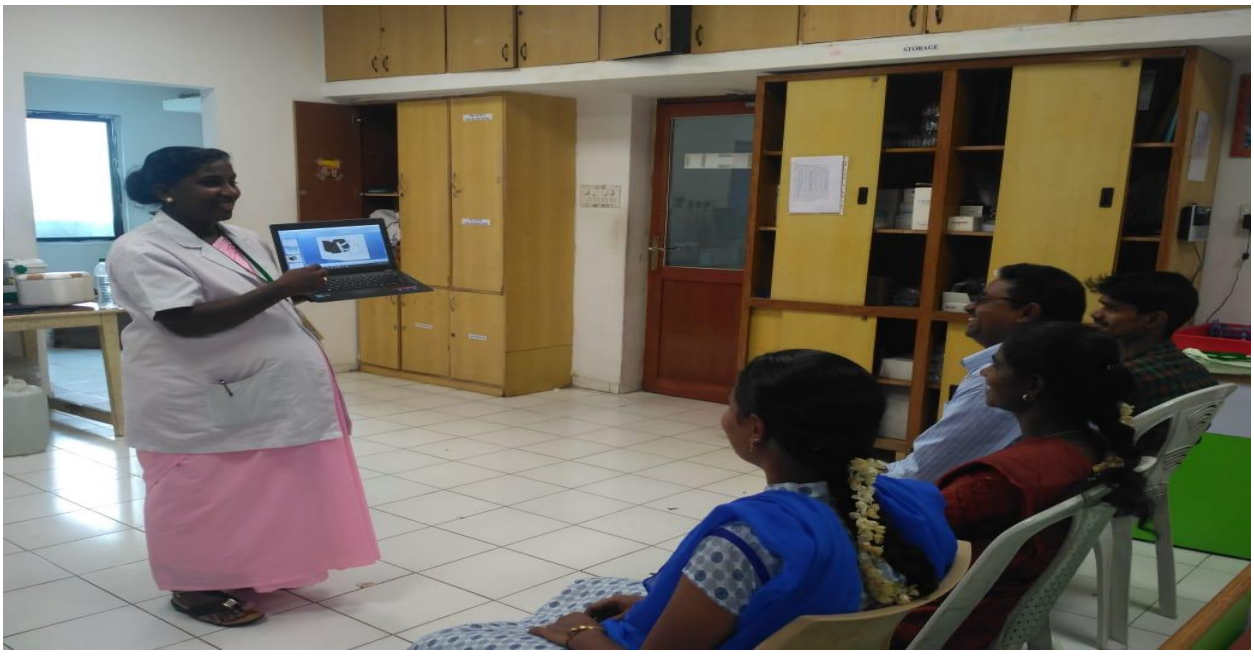
APPENDIX - M

DISSERTATION EXECUTION PLAN – GANTT CHART

S.No.	Academic calendar months	November – 2016 To October - 2017												November – 2017 To October - 2018											
		N	D	J	F	M	A	M	J	JU	A	S	O	N	D	J	F	M	A	M	J	JU	A	S	O
A	**Conceptual phase**																								
1	Problem identification																								
2	Literature Review																								
3	Clinical Field work																								
4	Theoretical Framework																								
5	Hypothesis Formulation																								
B	**Designing & Planning phase**																								
6	Research design																								
7	Intervention protocol																								
8	Population specification																								
9	Sampling plan																								
10	Data collection plan																								
11	Ethics procedure																								
12	Finalization of plans																								
C	**Empirical phase**																								
13	Data collection																								
14	Data preparation																								
D	**Analytical phase**																								
15	Data analysis																								
16	Interpretation of results																								
E	**Dissemination phase**																								
17	Presentation of report																								
18	Utilization of findings																								
	Calendar months	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10

APPENDIX – M

PRE-TEST



INTERVENTION - PPT

INTERVENTION - DEMONSTRATION

POST-TEST